Undergraduate Catalog

This is the Introduction, Degree Program/Majors Directory, General Information, and Policies sections of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Contents

General Information

Policies

Note: The information in this catalog is subject to change without notice. Many departments make changes in their degree requirements and course descriptions between printings of the catalog. For the most current information, check with department offices.

How to Use This Catalog

This is the University of Minnesota, Twin Cities *Undergraduate Catalog* for the academic years 2002-2004. This catalog is an academic planning tool for undergraduates. To learn how to use it, read this page.

Directory of Undergraduate Programs/Majors and Directory of Undergraduate Minors

The directories on the following pages list majors and minors and their corresponding colleges as well as the type of degree offered and the page where the program or minor can be found.

General Information

All undergraduates should read the General Information section, beginning on page 9. It includes information about academic support services, such as advising, that are crucial to success at the University. The section also includes basic information about admissions, financial aid, and student services.

Tuition and fees and registration information vary from semester to semester. Check the current *Class Schedule* for the most up-to-date information.

Policies

All undergraduates should read the Policies section, beginning on page 25. It lists requirements and standards that are common across all undergraduate colleges and programs on the Twin Cities campus. Topics include credit load, declaring a major, four-year graduation plan, grading and transcript policy, graduation requirements, liberal education requirements, and graduation with distinction or with honors.

Colleges and Programs

The college and program sections of this catalog provide detailed information about undergraduate degree programs and services offered by colleges on the Twin Cities campus. Most of the colleges are subdivided into departments. Certain departments offer cross-curricula programs that incorporate the resources of two or more departments. Interdepartmental groups, special studies, special projects, and other nondepartmental units are listed alphabetically within the degree listings for each college program.

To find an academic area of interest and its corresponding college, use the **Directory of Undergraduate Programs/Majors** on pages 4-6 or the index at the back of this catalog.

General Information About Each College

The general information section at the beginning of each college section contains information about admission, orientation, honors, policies, and graduation requirements. This information expands upon the general information at the beginning of the catalog and gives college-specific detail in these areas. Contact information for each college can be found in the directory listings after each college's general information section.

Degree Program Information

The degree program descriptions contain curricula overviews, degree requirements, and other relevant academic information. Students can choose from 137 majors, 37 stand-alone minors, and a wide variety of concentrations or tracks within many of the majors and minors.

To receive a bachelor's degree, students must satisfy specific degree program requirements, college requirements, and University requirements. Each college or program lists general information and college requirements and services at the beginning of its section. Degree requirements are listed at the end of each section. For information about University graduation requirements, see Graduation Requirements in the Policies section.

Course Descriptions

All undergraduate courses on the Twin Cities campus are listed in this section. See page 294 for a directory to find courses by academic categories, called "course designators." Course descriptions are listed alphabetically by course designator. Each course description includes the designator (abbreviation), number, title, prerequisites, and course content.

The courses listed in the catalog are available during the day and during fall and/or spring semester. Evening, May session, and summer courses can be found in the *Summer Session Catalog* or at <www.cce.umn.edu/pdm/bull.shtml>.

Some courses in this catalog are not offered every semester. To find out whether a course is offered in a particular semester, consult a copy of the *Class Schedule.* It lists courses, class hours, locations, and instructors; it also provides registration instructions, fees, final exam schedules, and courses that satisfy liberal education requirements. For detailed information about particular courses, consult the *Course Guide*.

The *Class Schedule* is available online at <www.onestop.umn.edu/schedule/html/tc.html> and the *Course Guide* can be found at <www.onestop.umn.edu/guide/html/tc.html>. Each publication also is available at University Bookstores during registration.

Administration and Faculty

University administrators and college administrators and faculty are listed in this section. In addition to name and title, the information about faculty includes their teaching awards, universities that awarded their degrees, and current research/teaching interests.

To find a major or minor and its corresponding college, use the Directory of Undergraduate Programs/Majors and the Directory of Undergraduate Minors on the following pages.

Directory of Undergraduate Programs/Majors

Directory of Undergraduate Minors

General Information

Overview

The University of Minnesota—with campuses in the Twin Cities, Duluth, Morris, and Crookston—is one of the most comprehensive universities in the country and ranks among the most prestigious universities in the United States. It is both the state land-grant university, with a strong tradition of education and public service, and a major research institution, with scholars of national and international reputation.

The University of Minnesota, Twin Cities is a classic Big Ten campus in the heart of the Minneapolis-St. Paul metropolitan area. The largest of the four campuses, it is made up of 20 colleges and offers undergraduate and graduate degrees in more than 370 fields of study, including about 160 bachelor's degree programs. With a host of nationally recognized, highly ranked programs, the University's Twin Cities campus provides a world-class setting for lifelong learning.

Other important parts of the University are the Supercomputer Institute in Minneapolis, Hormel Institute in Austin, Lake Itasca Forestry and Biological Station in Itasca State Park, Cloquet Forestry Center, Cedar Creek Natural History Area near Bethel, Rosemount Research Center, Horticultural Research Center at Excelsior, Minnesota Landscape Arboretum near Chanhassen, Sand Plain Research Farm at Becker, University of Minnesota Rochester, Soudan Underground Research Site, and research and outreach centers at Rosemount, Crookston, Grand Rapids, Morris, Lamberton, and Waseca. Through the University of Minnesota Extension Service, the University is present in each of Minnesota's 87 counties.

History

The University of Minnesota, which celebrated its sesquicentennial in 2001, was founded as a preparatory school in 1851, seven years before the territory of Minnesota became a state. Forced to close during the Civil War, the school reopened in 1867 and persevered with the help of Minneapolis entrepreneur John Sargent Pillsbury, a University regent, state senator, and governor, who is known today as the "Father of the University." Another factor in the school's survival in those tenuous early years was the enactment of the Morrill Act, or Land-Grant Act. Signed into law by President Lincoln in 1862, the act gave each state a grant of land within its borders stipulating that the income from the land was to be used to provide education for people of the state.

In 1869, the school reorganized as an institution of higher education. William Watts Folwell was inaugurated as the first president of the University on December 22, 1869. There were only nine faculty members and 18 students that year. Four years later at the first commencement, 2 students received bachelor of arts degrees. The first doctor of philosophy degree was awarded in 1888. In that same year, the Department of Agriculture opened on the University Farm in St. Paul. The Duluth campus joined the University in 1947; the Morris campus opened in 1960, the Crookston campus in 1966. A campus in Waseca opened in 1971 and closed in 1992.

Mission Statement

The University of Minnesota, founded in the belief that all people are enriched by understanding, is dedicated to the advancement of learning and the search for truth; to the sharing of this knowledge through education for a diverse community; and to the application of this knowledge to benefit the people of the state, the nation, and the world.

The University's mission, carried out on multiple campuses and throughout the state, is threefold:

Research and Discovery—Generate and preserve knowledge, understanding, and creativity by conducting high-quality research, scholarship, and artistic activity that benefit students, scholars, and communities across the state, the nation, and the world.

Teaching and Learning—Share that knowledge, understanding, and creativity by providing a broad range of educational programs in a strong and diverse community of learners and teachers, and prepare graduate, professional, and undergraduate students, as well as non-degree-seeking students interested in continuing education and lifelong learning, for active roles in a multiracial and multicultural world.

Outreach and Public Service—Extend, apply, and exchange knowledge between the University and society by applying scholarly expertise to community problems, by helping organizations and individuals respond to their changing environments, and by making the knowledge and resources created and preserved at the University accessible to the citizens of the state, the nation, and the world.

In all of its activities, the University strives to sustain an open exchange of ideas in an environment that embodies the values of academic freedom, responsibility, integrity, and cooperation; that provides an atmosphere of mutual respect, free from racism, sexism, and other forms of prejudice and intolerance; that assists individuals, institutions, and communities in responding to a continuously changing world; that is conscious of and responsive to the needs of the many communities it is committed to serving; that creates and supports partnerships within the University, with other educational systems and institutions, and with communities to achieve common goals; and that inspires, sets high expectations for, and empowers the individuals within its community.

Accreditation

The University of Minnesota, Twin Cities is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools (NCA). The University has been accredited since 1913, when the NCA's first list of accredited institutions was published. Its institutional accreditation was renewed most recently in 1996, when the Commission voted to continue the accreditation of the Twin Cities campus for 10 years through 2006, the maximum period allowable following the typical 10-year review and site visit. Background information about the 1996 review and the current "Record of Status and Scope" of the University's accreditation is available on the Web at <http://www.evpp.umn.edu/evpp/accred/>. For more information, call the NCA's Higher Learning Commission at 1-800-621-7440 or view their Web site <http://www.higherlearningcommission.org/>. The Twin Cities campus also includes nearly 100 academic programs that are accredited separately by various professional and disciplinary associations. An inventory of these programs is available at <http://www.evpp.umn.edu/evpp/accred/>.

Academic Support Services

Advising

When students arrive on campus for orientation, a primary concern is selecting a schedule of classes for the first term. Students also should begin planning their academic future. Academic advising, available to all undergraduates, is an important part of that process.

A University of Minnesota degree can (and should) represent an integrated experience that has broadened and deepened students' interests and refined their intellectual skills—skills used throughout life. Students should construct a program in which each course relates to the next and contributes to their personal development. Academic advisers—faculty, professional advisers, graduate students, and peers—are prepared to help students define and achieve their educational goals at every stage of their college career.

Colleges and programs have different advising systems, which are tailored to meet the specific advising needs of their students. Advising offices also have different preferences and procedures for communicating and setting up appointments. To begin planning, check with the following offices or visit <www.onestop.umn.edu/Academic/advising.html> for links to college advising Web sites:

(area code 612)

College of Agricultural, Food and Environmental Sciences
Student Services, 190 Coffey Hall, 624-7254

College of Architecture and Landscape Architecture
Student Services, 107 Architecture, 626-1000

College of Biological Sciences
Student Services, 223 Snyder Hall, 624-9717

College of Continuing Education
Student Support Services, 150 Wesbrook Hall, 624-4000
Inter-College Program, 107 Armory, 624-2004
Program for Individualized Learning, 107 Armory, 624-4020

Division of Dental Hygiene
Student Services, 9-436 Moos Tower, 625-9121

College of Education and Human Development
Student & Professional Services, 110 Wulling Hall, 625-6501

General College
Student Information Center, 25 Appleby Hall, 625-3339

College of Human Ecology
Student Services, 12 McNeal Hall, 624-1717

College of Liberal Arts
Student Information, 49 Johnston, 625-2020

Carlson School of Management
Undergraduate Studies, 1-105 Carlson School of Management, 624-3313

College of Natural Resources
Student Services, 135 Natural Resources Administration, 624-6768

School of Nursing
Student Services, 5-160 Weaver-Densford Hall, 624-4454

Institute of Technology
Student Affairs, 105 Lind Hall, 624-8504

Getting the Most From an Adviser

Advisers help students develop a perception of themselves and their relation to the future. Advisers introduce students to the University—teaching them to value the learning process, put the college experience into perspective, become more responsible, set priorities, and be honest with themselves. Although advisers have many different academic backgrounds, they share a broad vision of the University and help students navigate their academic progress in the most efficient and successful ways.

Students are encouraged to see their adviser before registration each term. This is especially important for first-year students, who may need help developing sound academic and career goals. Establishing regular communication with an adviser also allows the adviser to gain insights into a student's academic needs.

Students should schedule their appointments well before registration begins. They also should be prepared by studying this catalog, the *Class Schedule*, and the *Course Guide* before each registration period. These documents are available at University Bookstores or on the Web. Students should mark classes they are considering, have a tentative schedule in mind, and write down questions before talking to their adviser. To get the most from an adviser, students also should:

- ask questions and ask again if an answer is not clear.
- note the cancel/add deadlines for the registration period.
- become familiar with the Academic Progress Audit System (APAS) to understand what is required for a degree and to chart progress toward it. (See the Policies section of this catalog; see also the *Class Schedule*.)
- keep copies of their registration printouts, fee statements, and transcripts.
- ask advisers to share information about their academic areas of interest and how they chose their majors.
- make thoughtful decisions. Advisers can help define options, but students must make their own choices.

Achieving Academic Success

For many students, the first year of study is a time to explore academic interests and abilities. With careful planning, students can explore their interests and satisfy degree requirements at the same time. Nearly any academic interest can be satisfied by some program at the University. Advisers can help students discover the possibilities.

Undergraduates are admitted to the University on the basis of their accomplishments in high school and their achievements on college entrance examinations. Once on campus, their success depends on the quality and quantity of work applied to their studies. Many beginning students find themselves surprised by the amount of work they are expected to do outside of class and the speed at which they are expected to master subjects that they studied at a slower pace in high school. Satisfactory adjustment to the more demanding pace of the University is a key to academic success.

Academic workload is based on the number of credits a student is taking. The University Senate has established a policy, consistent with policies at other universities, that students are expected to average three hours of work per week for each credit taken. Therefore, a student taking 15 credits should expect 45 hours of work per week. The most successful students learn to plan and manage their workload, and they:

- attend all their classes,
- study every day,
- use instructors' office hours and tutorial services,
- take part in extracurricular campus activities.

Balance is a key to success, and successful students find that much valuable learning occurs outside the classroom in employment, student organizations, teams, clubs, and volunteer opportunities. For more information, see the *Gopher Guide*, available in University Bookstores.

Undergraduates must complete at least 15 credits per semester to graduate within four years. The number of courses a student will need to take each semester will vary. Most semester courses will be either 3 or 4 credits, so students need to take four or five courses per semester.

Many students must work to pay for college. Family and other obligations may also be significant for some students. Students need to consider all of their obligations as they plan their schedules each term. Advisers can help students make realistic choices and maintain steady progress toward a degree.

13-Credit Requirement—This requirement is being phased in over three years. Phase one: Degree-seeking students whose first term of enrollment as a new freshman or a new transfer at the University is fall semester 2002 or later are required to register

for at least 13 credits each semester. Phase two: Effective fall semester 2005, all degree-seeking students will be required to register for at least 13 credits each semester. To apply for part-time status, or to take fewer credits temporarily, students must petition their college. More information about the 13-credit minimum can be found at <www.onestop.umn.edu/13credits/index.html>.

The course registration queue gives priority to students whose immediately previous registration was "full-time" (i.e., for at least 13 credits). Under the queue, full-time seniors register first, followed by part-time seniors, full-time juniors, part-time juniors, full-time sophomores, etc. More information about the queue can be found at <www.onestop.umn.edu/newqueue /index.html>.

Four-year Graduation Plan

The Four-year Graduation Plan is an agreement between the student and the University that guarantees institutional support for completing degrees within four years. Under the plan, the student agrees to meet certain expectations for academic planning and performance. In turn, the University agrees to ensure that classes the student needs will be available. If the University cannot provide a required course, offer a substitution, or waive the requirement, it will pay the student's tuition to stay an extra semester to complete the course.

A few degree programs are designed to take longer than four years, and students in those programs are not eligible for the four-year guarantee.

Whether students in qualifying programs elect the four-year plan or not, they can graduate in four years simply by taking 15 or more credits each semester and working with an academic adviser to make sure their graduation requirements are being fulfilled.

Throughout the academic experience, certain steps will help students stay on track. Most are common sense and apply for any student.

Freshmen: During their first year, students should complete the freshman writing requirement and at least 30 credits—more if they are in a major that requires more than 120 credits. Advanced-placement credits and post-secondary education credits can be applied toward the 30 credits.

Sophomores: Students should make sure that they are taking classes to satisfy the liberal education requirements. They should also be exploring majors if they haven't yet selected one. Students must declare a major by the end of sophomore year.

Juniors: Students should confirm that their liberal education and core requirements are being completed. They should meet with their adviser to determine that they understand and are working toward completion of their major requirements. Students in the College of Liberal Arts should be completing their language requirements and taking the language proficiency test.

Seniors: Students must file for graduation by the beginning of the final semester. They must complete their senior project if their program requires one.

All students: Students should meet with their academic adviser once each semester during their freshman year and at the beginning of every subsequent year. All students are advised to take an average of 15 credits per semester and maintain good academic standing based on the requirements of their department or college.

Students should develop a study plan and review it with their adviser. They also should work with their adviser regularly to be certain that all checkpoint requirements are being met.

For more information, see Four-year Graduation Plan in the Policies section of this catalog or call 612-625-2525.

Using Online Resources

The computer is an essential tool for University students. Access to personal computing resources and the Internet is becoming increasingly important for students in and out of the classroom. (See Computing in this section of the catalog.) Helpful Web sites have been created to assist students and advisers. A good starting point is the Student Services site at <www.onestop.umn.edu>.

Registered students receive a University Internet account to access e-mail and other Internet services. See Computing in this section of the catalog.

Career Planning

Exploring a future career path is an important task for University students. The Twin Cities campus has many resources to assist them in career planning.

Each undergraduate college provides career planning and academic advising assistance. In addition, several specialized University-wide student services offices are available. By visiting the offices listed below, students will find advisers and resources to help explore career or major interests, gain relevant career related experience, develop job search skills, and connect with future employers. For information available on the Web, students should check the "Employment" site at <www.onestop.umn.edu/Employment>.

Career planning takes time. Students should plan to begin this process early in their University experience. Many of the following college career centers can be found online at <www.onestop.umn.edu/Employment /centers.html>.

(area code 612)

College of Agricultural, Food and Environmental Sciences
Career Services, 190 Coffey Hall, 624-2710

College of Architecture and Landscape Architecture
Student Services, 107 Architecture, 626-1000

College of Biological Sciences
Career Center, 229 Snyder Hall, 624-9270

College of Continuing Education
Student Support Services, 150 Wesbrook Hall, 624-4000

Division of Dental Hygiene
Student Services, 9-436 Moos Tower, 625-9121

College of Education and Human Development
Career Services, 110 Wulling Hall, 625-9884

General College
Transfer and Career Center, 127 Appleby Hall, 624-4346

College of Human Ecology
Career Services, 12 McNeal Hall, 624-6762

College of Liberal Arts
Career & Community Learning Center, 135 Johnston Hall, 624-7577

Carlson School of Management
Business Career Center, 1-110 Carlson School of Management, 624-0011

College of Natural Resources
Career Services, 135 Natural Resources Administration, 624-6768

Institute of Technology
Career Services, 50 Lind Hall, 624-4090

The University of Minnesota is one of the nation's top three public research universities, according to a July 2001 University of Florida study.

Campus-wide Career Centers

University Counseling & Consulting Services
Career Development Center, 302 Eddy Hall, 624-8344
Career counseling appointments, 624-3323
St. Paul Office, 199 Coffey Hall, 624-3323

Global Campus/Study Abroad
230 Heller Hall, 626-9000

International Student and Scholar Services
190 Hubert H. Humphrey Center, 626-7100

Disability Services
Careers Online Projects, 230 McNamara Alumni Center, 626-9658

Other Academic Support Services

In addition to collegiate advising offices, the Twin Cities campus has many resource offices to help students achieve academic success. Below is a list of several of these offices. For more detail about these and other services, students should contact their college offices or refer to the *Gopher Guide*.

(area code 612)

African American Learning Resource Center
315 Science Classroom Building, 625-1363

American Indian Learning Resource Center
125 Fraser Hall, 624-2555

Asian/Pacific American Learning Resource Center
315 Science Classroom Building, 624-2317

Assessment & Achievement Center
1901 University Ave. S.E., 2nd floor, 626-1055

Chicano/Latino Learning Resource Center
315 Science Classroom Building, 625-6013

Disability Services
180 McNamara Alumni Center, 626-1333

Global Campus
230 Heller Hall, 626-9000

International Student and Scholar Services
190 Hubert H. Humphrey Center, 626-7100

Learning and Academic Skills Center
109 Eddy Hall, 624-3323

Residence Hall Academic Service Centers
624-2994

Student Writing Center
306b Lind Hall, 625-1893

Writing Support Network
<http://cisw.cla.umn.edu/wsn.html>

Academic Resources

Bookstores

The University Bookstores have five campus locations which offer new and used textbooks, course packets, reference and research materials, school supplies, and University clothing and gifts. In addition, the Bookstores offer other services, including a textbook buy-back program, photo processing, visiting author discussions, and graduation supplies (e.g., caps and gowns, announcements, and college rings).

To locate course books, students can check the listings on the Bookstores Web site <www.bookstore.umn.edu>. This site indicates which store to go to for the various text requirements. It also allows students to order their textbooks and course materials through Gopher Books Online, which ensures them of getting the correct materials.

(area code 612)

East Bank Store
Williamson Hall, 625-6000

West Bank Store
Anderson Hall, 625-3000

St. Paul Store
St. Paul Student Center, 624-9200

Health Sciences Store
Moos Tower, 625-8600

Law School Store
Law Center, 626-8569

Libraries

Housed in six major facilities and nine branch sites, the University Libraries system includes more than 5.8 million print volumes, 41,000 serial subscriptions, 5.7 million microforms, 2.7 million government documents, and 404,000 maps, making it the 17th largest research library in North America.

To support the many disciplines at an institution as comprehensive as the University of Minnesota, University Libraries acquires, catalogs, and maintains information in practically every field of knowledge, in every language, from every time period, and in every conceivable format. Within the system are outstanding special collections including the history of medicine, social welfare, computing, architecture, American poetry, Afro-American literature, children's literature, history of European expansionism, cartography, British colonialism in India, Scandinavian studies, forestry, engineering and technical standards, and federal and international government documents. The is a regional depository for all publications distributed by the U.S. Government Printing Office.

LUMINA®, the online network, provides computerized access to the library collections and serves as a gateway to local, national, and global information sources. MNCAT®, the online catalog, is accessible through LUMINA® and provides a nearly complete listing of book and journal holdings. Since 1992, University Libraries has been adding access to full-text periodicals, academic journal articles, and newspapers. Students can access both LUMINA® and MNCAT® from library computer terminals or remotely through the University Libraries' Web site <www.lib.umn.edu>.

Each major branch of the University Libraries houses different subjects.

- Andersen Library (West Bank)—computer history; children's literature; immigration history; manuscripts; social welfare history; special collections/rare books; University Archive; YMCA Archives; MINITEX
- Bio-Medical Library (Diehl Hall, East Bank)—health sciences
- Law Library (Law Building, West Bank)—legal materials
- Magrath Library (St. Paul)—agriculture; biological sciences; human ecology; design, housing, and apparel; vocational education; applied statistics; food science and nutrition; family social science; rural sociology; social work; applied economics
- Science and Engineering Library (Walter Library, East Bank)—scientific and technical materials
- Wilson Library (West Bank)—social sciences, literature, art, education/psychology

For locations of other special collections or subject areas, and for information on library hours, check the library Web site <www.lib.umn.edu> or call 612-624-4552.

Computing

On campus, students can use centrally provided computing labs, which are equipped with commonly used software and Internet access. Visit the Academic and Distributed Computing Services (ADCS) Web site <www.umn.edu/adcs/publabs> for student computer lab locations, hours, and equipment.

Many students choose to buy their own personal computer and software. The University TechMart Web site <www.techmart.umn.edu> offers a variety of hardware and software options at considerable discounts, or visit the ADCS computer showroom in 152 Shepherd Labs or 50 Coffey Hall for consultation.

Registered University students initiate their account by visiting the ADCS Web site <www.umn.edu/initiate> or by going to one of the computer helplines:

East Bank
152 Shepherd Labs, Mon.-Fri., 8 a.m.-5 p.m.

St. Paul
50 Coffey Hall, Mon.-Fri., 8 a.m.-5 p.m.

West Bank
93 Blegen Hall, Mon.-Fri., 8 a.m.-5 p.m.

ADCS offers e-mail and Internet orientation classes. Topics include initiating and managing University Internet accounts, obtaining software for Internet access, and learning about other University technology resources. Visit the ADCS training Web site <www.umn.edu/adcs/training> for a schedule of orientation classes or call 612-625-1300 for more information.

ADCS also provides comprehensive call-in support through the technology helpline at 612-301-4357. Call for help with Internet and e-mail support, password changes, on-campus telephone and network support, and technology troubleshooting. Hours are Monday–Thursday, 8 a.m.–11 p.m.; Friday, 8 a.m.–5 p.m.; Saturday, 12 p.m.–5 p.m.; and Sunday, 5 p.m.–11 p.m. Computer and Internet support is also available via e-mail at help@umn.edu. For additional resources, visit the ADCS Web site <www.umn.edu/adcs>.

Undergraduate Research

The Undergraduate Research Opportunities Program (UROP) offers financial awards twice yearly to full-time undergraduates for research, scholarly, or creative projects undertaken in partnership with a faculty member. UROP offers a maximum award of $1,700 ($1,400 in a stipend for the hours worked on the project and $300 for supplies and expenses required by the project). Undergraduate students in all colleges are welcome to participate in the program and are able to work with any University faculty member. Applications are judged on the quality of the proposed project and the educational benefit to the student. Although the program is competitive, funding rates are often over 80 percent.

Application deadlines are in early March for a July 1 start date and in early October for a January 1 start date. Information and applications are available from the UROP office in 325 Johnston Hall (612-625-3853) or <www.urop.umn.edu>.

In addition, several summer research opportunities are available in a variety of areas at the University. These programs often involve full-time summer projects and can include a stipend, expense money, and room and board. For more information, contact the UROP office.

Study Abroad

Study abroad is the single most effective experience students can have to broaden their international awareness and sharpen their skills for today's global job market. More than 230 study abroad options in 80 countries are available to University undergraduates through the Global Campus/Study Abroad in the Office of International Programs. Undergraduates in every major are encouraged to earn credit toward their degree through study abroad.

A World of Options—The Global Campus offers world-class programs, including short-term faculty-led opportunities, intensive language study, internships, study at a foreign university, and special theme programs. Programs are offered in collaboration with academic departments and on-site foreign institutions, and many courses have been evaluated to meet the University's liberal education and major requirements. Students may choose from academic year, semester, May session, and summer terms. Many programs in English are available. A number of programs offer credit-bearing internship and research opportunities in addition to classroom coursework.

The vast majority of students on study abroad earn University of Minnesota residence credit. Students on some exchange programs and programs not listed in the Global Campus study abroad catalog earn transfer credit, which is facilitated by the Global Campus.

Studying Abroad in a Major—Virtually every topic of study is represented in study abroad. Students in any field—from accounting to engineering, sociology to zoology—can make progress toward their degree requirements while overseas. The Global Campus works with University colleges and departments to develop a list of options for each major. Students should consult with Global Campus and major advisers to discuss how study abroad can fit smoothly with their degree program.

Foreign Studies Minor—The foreign studies minor is an individualized, interdisciplinary College of Liberal Arts minor open to all University of Minnesota undergraduates. This minor integrates a study abroad experience with intercultural communication, language study, and related coursework focusing on a country or region of study. See the College of Liberal Arts section of this catalog or contact the Global Campus office for more information.

Scholarships and Other Financial Resources—Most financial aid can be used for study abroad, and financial aid awards can be revised to include study abroad costs. Over $500,000 in scholarships and grants are available annually to University of Minnesota students for study abroad. Also, the Global Campus has secured reduced program fees for University students participating in a variety of programs.

Study Abroad Alumni Society—The Study Abroad Alumni Society (SAAS) is a Global Campus student organization designed to bring together students who have had intercultural experiences. SAAS activities are scheduled throughout the year and include cultural encounters, community service, and a year-end activity. SAAS also offers a mentoring program that pairs return study abroad students with students preparing to study abroad. For more information, visit <www.UMabroad.umn.edu/alumni.html>.

For More Information—Advisers, catalogs, brochures, and a computer for Web surfing are available in 230 Heller Hall. Or call 612-626-9000 or visit the Global Campus Web site <www.UMabroad.umn.edu>.

Students can study in one of more than 230 study abroad programs in 80 countries.

Admissions and Prospective Student Services

Admission Information

For information about University of Minnesota, Twin Cities admission, academic programs, and other student services and educational resources, write or call:

Office of Admissions

University of Minnesota
240 Williamson Hall
231 Pillsbury Drive S.E.
Minneapolis, MN 55455-0213 USA

Telephone (Twin Cities) **612-625-2008**
Toll free (continental United States)..... **1-800-752-1000**
TTY (for deaf/hard-of-hearing callers) **612-625-9051**

E-mail ..... **admissions@tc.umn.edu**
or visit the Web site ..... **<http://admissions.tc.umn.edu>**

Campus Visits and Tours

To make visit reservations, call the Office of Admissions ***VISITLINE*** at 612-625-0000 or 1-800-752-1000 (TTY 612-625-9051).

Admissions Office Hours

The Office of Admissions is open year-round, from 8:00 a.m. to 4:30 p.m., Tuesday through Friday, and Monday until 6 p.m. It is also open on Saturday mornings between early September and mid-May, *except* around University holidays. During term breaks and around University holidays, some campus services may be limited. *Students planning to schedule a visit to campus should call ahead to confirm that the services they need will be available.*

General Application and Admission Information

For official and up-to-date information about the University's admissions policies, procedures, and deadlines, please see the latest edition of the *Undergraduate Application Booklet* available from the Office of Admissions or online at <http://admissions.tc.umn.edu>.

How to Apply—Prospective freshmen and transfer students may obtain application materials on the World Wide Web at <http://admissions.tc.umn.edu> or by contacting the Office of Admissions (see addresses and phone numbers above). There are separate applications for:

- freshmen and transfers from colleges outside the University of Minnesota system,
- transfers from other colleges inside the University system,
- international students, and
- adult special (non degree-seeking) students.

Freshmen must submit a completed application, official high school transcripts, official college transcripts (if applicable), ACT or SAT test scores, the application fee, and any other information requested by the University.

Transfer students must submit a completed application, official transcripts from high school (if the student has fewer than 26 semester credits or is applying to the College of Agricultural, Food and Environmental Sciences; College of Human Ecology; or College of Natural Resources) and all postsecondary institutions attended, ACT or SAT scores (if the student has fewer than 26 semester credits), the application fee, and any other information requested by the University.

International students must submit a completed application, official transcripts and official English translations for secondary school and all postsecondary institutions attended, the application fee, English proficiency test scores (see TOEFL or MELAB under English Proficiency below) for nonnative English speakers, the financial certification statement (for students requiring the I-20 form for a student visa), and any other information requested by the University.

All transcripts and English test scores must be received by the application deadlines. International students applying as freshmen are not required to submit ACT or SAT scores, although they are welcome to do so as additional support for their application. International students applying for non-degree seeking admission should use the international student application.

See also the college and program sections of this catalog for freshman and transfer admission.

When to Apply—Prospective students should apply as early as possible for the term they wish to start. For information on specific application deadlines for upcoming semesters, contact the Office of Admissions.

English Proficiency—Students whose native language is not English may be required to take the Test of English as a Foreign Language (TOEFL) or the Michigan English Language Assessment Battery (MELAB). To register for the TOEFL, contact a Sylvan Learning/Prometric Testing Center or contact TOEFL Services/Educational Testing Services (P.O. Box 6151, Princeton, NJ 08541-6151 USA, 609-771-7100). To register for the MELAB, contact the English Language Institute, 3020 North University Building, University of Michigan, Ann Arbor, MI 48109-1057 USA, (734-764-2416). Students in the Twin Cities area may contact the Office of Admissions for information about registering for the MELAB or TOEFL test.

Updating an Application—Students who are not admitted but wish to be considered for a later semester must request that their application be updated. The request must be made before admissions are closed for the new semester.

Updating an Offer of Admission—Students who are admitted for a semester but do not enroll for that semester must request that their admission status be updated. The request must be made before admissions are closed for the new semester. If admission standards have changed in the meantime, the request will be reviewed in terms of the new requirements.

Readmission—Students who were previously enrolled in an undergraduate degree program on the University of Minnesota, Twin Cities campus but have not registered for two consecutive semesters will be placed on *inactive* status. Students should contact their former college of enrollment for more information. See also the Policies section of this catalog.

Confirmation Fee—All freshmen and most new transfer students will be required to confirm their intent to enroll by paying a nonrefundable enrollment confirmation fee. The deadline for payment of the confirmation fee will be indicated on the *Enrollment Confirmation* form included with the letter of admission. For international students, athletes, and other special cases, the fee will be deferred until registration.

Orientation—Newly admitted students receive information from their college of admission, including an invitation to **New Student Orientation**. Attendance at orientation is required. Invitations will specify the exact dates of each student's orientation. For most new students, orientation lasts two days, although some transfer students attend only one day. The dates of orientation vary by college and date of admission. (Students who cannot attend their assigned date may request an alternate date.)

Twin Cities Campus Colleges

On the next page is a list of the Twin Cities campus colleges that admit freshmen, those colleges and programs that require a year or more of undergraduate work for admission, and those colleges and programs that require a bachelor's degree or the equivalent.

Note: Most College of Education and Human Development teaching licensure programs are postbachelor's programs. Professional architecture and landscape architecture programs are master's level. Physical therapy and occupational therapy are master's programs. For more information, contact the college or program office.

Freshman and transfer admitting colleges

College of Agricultural, Food and Environmental Sciences
College of Biological Sciences
General College (GC *admits freshmen only)*
College of Human Ecology
College of Liberal Arts
Carlson School of Management
College of Natural Resources
Institute of Technology

Transfer colleges and programs requiring one or more years of previous college work before entry

College of Architecture and Landscape Architecture
Program in Dental Hygiene
School of Dentistry*
College of Continuing Education
College of Education and Human Development*
Program in Medical Technology
Program of Mortuary Science
School of Nursing
College of Pharmacy*
College of Veterinary Medicine*

Colleges and programs requiring a bachelor's degree before entry

Graduate School*
Law School*
Medical School*
Program in Occupational Therapy*
Program in Physical Therapy*
School of Public Health*
**See other University catalogs for details about these schools, colleges, and programs.*

Freshman Admission

Definition

Applicants who are graduating from high school in the spring preceding fall enrollment (regardless of total college credits completed while in high school) or high school graduates who have not enrolled at a post-secondary institution after high school are considered **freshmen** for admission purposes.

Application Review Process

To determine which freshman applicants will be admitted to the University of Minnesota, Twin Cities, the Office of Admissions makes an overall assessment of each application to determine the applicant's potential for academic success.

The Office of Admissions gives primary consideration to:

- completion of high school courses (see below);
- high school rank percentile (HSR);
- test scores (ACT or SAT);
- patterns of coursework and performance;
- performance in completed college courses at the time of application.

All of the additional information provided in the application will be considered routinely as part of the admission process to determine an applicant's admissibility.

High School Course Preparation

Students who graduated from high school before 1987 (or have earned a U.S. bachelor's degree or its equivalent) are not required to meet the University's high school course preparation requirements.

All applicants are expected to have completed at least the University's high school course preparation requirements:

- four years of English[1], with emphasis on writing, including instruction in reading and speaking skills and in literary understanding and appreciation;
- three years of mathematics[2], including one year each of elementary algebra, geometry, and intermediate algebra;
- three years of science[2], including one year each of biological and physical science and including laboratory experience;
- three years of social studies, including one year each of geography (or a combination of courses incorporating geographic studies, e.g., world history, western civilization, Latin American studies) and U.S. history;
- two years of a single second language;
- one year of visual or performing arts, including instruction in the history and interpretation of the art form (e.g., theater arts, music, band, chorus, orchestra, drawing, painting, photography, graphic design).

[1] **Students who are not native speakers of English**, *and who have ACT English and reading scores of 17 or lower (or SAT verbal score of 420 or lower), may be asked to submit scores from the MELAB or TOEFL. For details, contact the Office of Admissions.*

[2] *The* ***College of Biological Sciences*** *and* ***Institute of Technology*** *require* four years of mathematics, *including geometry in two and three dimensions and trigonometry. Both colleges also require three years of science to include* one year each of biological science, chemistry, and physics.

Note: Applicants who are missing the newest requirements—one year of geography and one year of visual and/or performing arts—will not be denied admission if they are otherwise admissible. In addition, applicants who do not complete the other high school course preparation requirements may sometimes be admitted if they have promising academic records and meet other admission requirements. Students admitted with deficiencies must make them up before graduating from the University.

Admission to Honors Programs

Students who have an outstanding record of academic achievement and seek the challenge and special rewards of honors study may be eligible for admission to an honors program.

Honors opportunities and benefits include:

- special enrichment programs,
- personalized instruction,
- research partnerships with professors,
- participation in honor societies, and
- graduation with honors.

Students admitted to honors generally have strong high school records and test scores. Applicants who don't meet a program's high school rank and test score criteria will generally be considered on an individual basis.

The College of Agricultural, Food and Environmental Sciences; College of Biological Sciences; College of Human Ecology; College of Liberal Arts; Carlson School of Management; College of Natural Resources; and Institute of Technology admit freshmen to their honors programs. Several other colleges have honors opportunities for students who have completed a year or more of college work. For information about eligibility and application procedures, contact the Office of Admissions.

Admission of Post-Secondary Enrollment Options (PSEO) Students

Credits earned by students in the Minnesota PSEO program will count as part of their regular University record should they be admitted to a Twin Cities campus degree program after graduating from high school (see transfer credit guidelines below).

Students must follow all new freshman application procedures and deadlines such as the deadlines for freshman application, scholarships, honors, financial aid, housing, and orientation.

Admission With GED Examination

Nongraduates who have taken the GED examination may apply for admission. The admission decision will take into consideration years out of school, other educational experience, and tested academic aptitude (ACT). GED test scores are required.

Transfer Admission

Definition

Applicants who have enrolled at a post-secondary institution or internationally recognized foreign college or university after high school are designated as transfer students. Most colleges and programs require a cumulative grade point average of at least 2.50 or higher (on a 4.00 scale) for applicants to be competitive. Applicants should also have completed designated prerequisite courses.

Admission decisions are based on applicants' demonstrated potential for successfully completing the program to which they apply. In programs with restricted class size, applications are individually reviewed by a committee.

Applicants who have completed less than a full year of college coursework at the time of application will be considered for admission using a combination of transfer and freshman admission criteria. High school and college transcripts and ACT or SAT (where required) will be reviewed.

Transfer students who graduated from high school in 1987 or later and have not earned a bachelor's degree or its foreign equivalent will be expected to complete any missing high school preparation requirements within one year of enrollment and before graduation. See **High School Course Preparation** on page 17.

Transfer Application Procedures

Applications—Complete the **University of Minnesota, Twin Cities Campus Application for Admission** (available online or from the Office of Admissions). Special additional applications required by professional schools will be sent to applicants, either on request or following receipt of the regular application.

Transcripts—Applicants must arrange for *official* transcripts to be sent from *every postsecondary institution they have attended, whether or not they successfully completed coursework at those institutions*. To be regarded as official, transcripts must bear the original signature of the registrar or the seal of the institution or must be college-certified or printed on security paper. *The transcripts must have been issued within the last year.*

Timing—Applicants should be sure that transcripts are sent at the time they apply, even if they have coursework in progress.

Transfer Credit Evaluation—When students are admitted, their previous college record will be evaluated to determine which courses they have taken at other institutions will transfer to the University of Minnesota.

Special Types of Transfer Admission

Summer-only Registration—Students who have previous college work and are in good standing at their own college may enroll in summer session courses without being formally admitted to the University. *Registration for summer session classes does not constitute admission to the University*. Students who plan to continue in the regular academic year must apply for admission by the published application deadline.

Non-degree Admission—Students who wish to enroll in day school courses for personal reasons and who do not wish to be formally admitted to an undergraduate degree program may apply for admission as a non-degree student by filling out a special application. Subsequent admission to a degree program may be possible on recommendation of the college.

To qualify for admission as a non-degree student, a student generally must meet the same requirements as a student applying for admission to a degree program. Most non-degree students already have earned bachelor's degrees. Some colleges—including the College of Liberal Arts—will consider requests for non-degree status from students who do not have degrees.

***Note**: Formal application is necessary for non-degree status.* For more information, contact the Office of Admissions.

Change of College or Status From Within the University— The Office of the Registrar processes admission applications from current and former University students who wish to transfer into another University undergraduate program. To transfer to another undergraduate program, a student must submit a completed *Application for Change of College* to the One Stop Student Services Center (200 Fraser Hall, 130 West Bank Skyway, or 130 Coffey Hall) by the application deadline. For deadlines or to download an application, see the Office of the Registrar Web site <www.onestop.umn.edu/Forms/>.

National Student Exchange Program—The University is a member of the National Student Exchange (NSE) program, which sponsors student exchanges between participating institutions of higher learning. Exchange students usually have highly specific educational goals. For information on the program, contact the NSE Coordinator, Career & Community Learning Center, 345 Fraser Hall, 106 Pleasant Street S.E., Minneapolis, MN 55455, (612-626-2044).

Transfer of Credit Policies

Credit for coursework taken at other institutions will be transferred subject to the following considerations: the mission of the institution from which credits would be transferred; the comparability of the coursework with University of Minnesota coursework; and the appropriateness of the coursework for meeting baccalaureate degree requirements at the University of Minnesota.

Regional accreditation usually serves as the primary criterion for determining the transferability of coursework from other institutions. Coursework from institutions lacking such accreditation may be individually reviewed. Appropriate coursework from internationally recognized foreign colleges and universities will transfer for credit. Credit is not normally transferred from specialized or proprietary institutions, military schools, or industry-based education programs.

All attempted credits, whatever the outcome, must be reported on a student's application and will be considered in the review process. Students may not, in the interest of "making a fresh start," fail to report courses taken at other institutions for which they received less-than-satisfactory grades.

Conversion of Quarter to Semester credits—The University follows a semester calendar. Quarter credits from other U.S. institutions are converted to semester credits by multiplying the number of quarter credits by two-thirds. For example, 3 quarter credits equal 2 semester credits.

Residence Requirement for Graduation—To complete a degree at the University, a student must complete at least 30 semester credits offered through the University, including 24 credits taken after admission to the major or program and taken from the college offering the major or program.

For more information, see Graduation Requirements in the Policies section of this catalog.

Grade Records—Individual transfer courses, credits, and grades will not appear on a student's University transcript. The transfer GPA is not computed into the University of Minnesota GPA.

General Transfer Guidelines

- Credits earned in courses comparable to those offered by the University of Minnesota, Twin Cities will usually transfer routinely. General education courses are routinely accepted in transfer (although they will not necessarily fulfill the University's liberal education requirements).
- Credit is usually not allowed for courses that are not designed for transfer to baccalaureate degree programs on the Twin Cities campus. Such courses are usually highly specialized or are vocational.
- There is no absolute limit on the number of credits that may be transferred from another college.
- Religious studies credits transfer if they are not doctrinal, confessional, or sectarian in nature. Religious studies courses from public institutions transfer without special review; religious studies courses from all other institutions will be evaluated by appropriate college or department faculty.
- No more than 6 semester credits from physical education, study skills, or applied music (in any combination) will count toward a student's degree, unless the credits are a required part of the student's program requirements. This provision establishes a total of 6 credits from all three areas combined (not 6 from each) as the number that will count toward a degree.
- Upper division credit (junior or senior level) is allowed when the course was upper division at the previous school, regardless of the level of an equivalent course at the University.
- Repeated courses: When a student has repeated a course, only the last enrollment for the course shall transfer.
- The minimum grade required for transfer is D. The college or program determines how the course may be used to meet degree requirements.
- Independent study, field experience, and internships may or may not transfer, depending on the level and appropriateness of the learning experience.
- Remedial or developmental courses are not considered college-level and do not transfer.
- Study abroad courses may or may not transfer, depending on the international institution offering the courses and other variables.
- Credit for nontraditional learning (AP, IB, CLEP, military schools, DANTES) will be evaluated by the Office of Admissions for appropriateness and comparability to University of Minnesota bachelor's degree programs. Credit granted by another institution for these nontraditional experiences will be re-evaluated for content and comparability.
- Twin Cities campus colleges do not automatically grant junior standing to students with associate in arts degrees. Credit is granted for coursework, not for degrees.

Advanced Placement (AP)—High school students may earn college credit in some subject areas by receiving satisfactory scores on the College Entrance and Examination Board Advanced Placement Program examinations. For a list of AP credit awards, contact the Office of Admissions or see the admissions Web site at <http://admissions.tc.umn.edu>.

International Baccalaureate (IB)—High school students may earn college credit in some subject areas by receiving acceptable scores on higher-level International Baccalaureate examinations. For a list of IB credit awards, contact the Office of Admissions or see the admissions Web site at <http://admissions.tc.umn.edu>.

College Level Examination Program (CLEP)—Students may earn college credit for successful completion of some CLEP examinations. For additional information, contact the Office of Admissions.

Minnesota Transfer Curriculum

To simplify the transfer process, the University of Minnesota and the Minnesota State Colleges and Universities have developed a Minnesota Transfer Curriculum (MnTC). Students who complete the MnTC at a participating college and then transfer to the University of Minnesota, Twin Cities have completed the lower division portion of the University's liberal education (LE) requirements. MnTC completion must be noted on the official transcript.

Note: Practitioner-oriented degrees through the College of Continuing Education (CCE) do not follow the Minnesota Transfer Curriculum. For more information, call CCE Student Support Services at 612-624-4000.

Planning to Transfer?

Minnesota's public colleges and universities are working to make transfer easier. Students can help if they plan ahead, ask questions, and use pathways created by transfer agreements. The following transfer information is included in catalogs from all Minnesota public colleges and universities.

Each year, the University offers more than 125 freshman seminars, limited to 20 students and taught by high-ranking faculty, including President Mark Yudof.

Preparing for Transfer

If students are currently enrolled in a college or university, they should

- discuss their plans with the campus transfer specialist in the Office of Admissions.
- call or visit their intended transfer college. They should obtain the following materials and information:
  —college catalog
  —transfer brochure
  —information on admissions criteria and on materials required for admission (e.g., portfolio, transcripts, test scores). Note that some majors have limited enrollments or their own special requirements such as a higher grade point average.
  —information on financial aid (how to apply and by what date)

After they have reviewed these materials, they should make an appointment to talk with an adviser/counselor in the college or program they want to enter. Be sure to ask about course transfer and admission criteria.

If they are not currently enrolled in a college or university, they might begin by meeting with a transfer specialist or an admission officer at their intended transfer college to plan the steps they need to take.

Understanding How Transfer of Credit Works

The receiving college or university decides what credits transfer and whether those credits meet its degree requirements. The accreditation of both a sending and a receiving institution can affect the transfer of the credits a student earns.

Institutions accept credits from courses and programs like those they offer. They look for similarity in course goals, content, and level. "Like" transfers to "like."

Not everything that transfers will help a student graduate. Baccalaureate degree programs usually count credits in three categories: general education, major/minor courses and prerequisites, and electives. The key question is, "Will a student's credits fulfill requirements of the degree or program chosen?"

If a student changes a career goal or major, she or he might not be able to complete all degree requirements within the usual number of graduation credits.

Applying for Transfer Admission

Application for admission is always the first step in transferring. Students should fill out the application as early as possible and enclose the application fee.

Students should request that official transcripts be sent from every institution attended. GED test scores and high school transcripts might also be required.

Recheck to be certain all necessary paperwork was supplied. Most colleges make no decisions until all required documents are filed.

Students who have heard nothing from their intended college of transfer after one month should call to check on the status of their application.

After the college notifies students that they have been accepted for admission, their transcripted credits will be evaluated for transfer. A written evaluation should tell students which courses transfer and which do not. How a student's courses specifically meet degree requirements may not be decided until she or he arrives for orientation or has chosen a major.

If students have questions about their evaluation, they should call the Office of Admissions and ask to speak with a credit evaluator. Ask why judgments were made about specific courses. Many concerns can be cleared up with an understanding of why decisions were made. Students can appeal of they are not satisfied. See the following "Rights as a Transfer Student."

Rights as a Transfer Student

- A clear, understandable statement of an institution's transfer policy.
- A fair credit review and an explanation of why credits were or were not accepted.
- A copy of the formal appeals process.

Usual appeals steps are:

- Student fills out an appeals form. Supplemental information you provide to reviewers—a syllabus, course description, or reading list—can help.
- Department or committee will review.
- Student receives, in writing, the outcome of the appeal.
- Student can appeal decision to Office of Admissions.
- At a student's request, a review of her or his eligibility for financial aid or scholarships.

For help with transfer questions or problems, students should see their campus transfer specialist.

Residency and Reciprocity

Residency—To establish Minnesota residency for University of Minnesota purposes and thus be eligible for resident admission standards and resident tuition rates, students must be able to show 1) that they have resided in Minnesota continuously for at least one calendar year prior to the first day of the term for which they are seeking admission or resident tuition status and 2) that school attendance is not their primary reason for residing in this state.

For a residency application and more information, contact the University's residency adviser, 240 Williamson Hall, Minneapolis campus, (612-625-6330).

Reciprocity—Qualified residents of Wisconsin, North Dakota, South Dakota, and Manitoba who attend the University of Minnesota, Twin Cities may apply for reciprocity privileges and pay a tuition rate equal or comparable to the Minnesota resident rate.

Midwest Student Exchange Program (MSEP)—Residents of Kansas, Michigan, Missouri, or Nebraska may be eligible to pay reduced tuition at the University of Minnesota, Twin Cities through the Midwest Student Exchange Program. Students who qualify pay 150 percent of Minnesota resident tuition.

The following Twin Cities campus undergraduate colleges participate in the MSEP reciprocity program: College of Liberal Arts; College of Agricultural, Food and Environmental Sciences; College of Architecture and Landscape Architecture*; College of Biological Sciences; College of Education and Human Development*; College of Human Ecology; College of Natural Resources; Carlson School of Management; Dental Hygiene; School of Nursing; and Institute of Technology. **Note:** MSEP reciprocity eligibility will be granted for the first baccalaureate degree only.

Application for reciprocity is separate from application for admission. Students who are nonresidents and have not applied or are not eligible for reciprocity will be charged nonresident tuition rates.

** Limited to undergraduate degree only.*

For more information about reciprocity, call the University residency adviser at 612-625-6330.

Registration

Students are responsible for registering for classes before each term. The *Class Schedule* is an essential resource for registration. It includes complete registration instructions and time limits for making registration changes.

New students receive detailed registration instructions during orientation. Registration opens about five weeks before the start of each term, except fall semester, for which continuing students register during spring semester. Students register according to an alphabetical rotation, which is published in the *Class Schedule* and is available on the Web <www.onestop.umn.edu/Courses/schedule.html>.

Most students register via the Web <www.onestop.umn.edu/Enrollment/>; others complete a credit enrollment request form and take it to the Student Services Center in 200 Fraser Hall, 130 West Bank Skyway, or 130 Coffey Hall.

Students should follow these basic steps before registration:

- Make an appointment with an adviser at least two weeks before registration begins.
- Check for registration holds or the need for adviser approval.
- Pick up a copy of the *Class Schedule* at University Bookstores about a week before registration begins or check the Web <www.onestop.umn.edu/Courses /schedule.html>.
- Consult other resources, including college handbooks, the *Course Guide*, and this catalog.

Tuition and Fees

For current information about tuition and fees, see the *Class Schedule* or visit the tuition and fees Web site at <www.onestop.umn.edu/Finances/tuitionrates /index.html>.

Financial Aid

A good place for students to start planning their college finances is the University's Student Finances Web site <www.onestop.umn.edu/Finances/>. This site includes links to information about University student accounts, tuition and fees, financial aid eligibility, and the types of aid available. The "Financial aid basics" section has cost estimates to attend the University and describes the types of financial aid—grants, scholarships, work-study employment, student loans—that might be available to help students meet those costs.

Cost estimates are based on anticipated state funding for the University and cost of living averages for the Twin Cities metropolitan area. Actual costs will depend on where students live, their transportation, and other lifestyle choices. In addition, a directory of Web sites and other contact information for on-campus and off-campus financial aid resources is available at <www.onestop.umn.edu/Finances/quicklink02.html>.

To apply for financial aid, students are encouraged to complete the Free Application for Federal Student Aid (FAFSA) available at <www.fafsa.ed.gov>. Printed forms are also available on campus at Student Services Center locations, University Bookstores, St. Paul Student Center, University libraries, residence halls, college advising offices, and public libraries. A new application cycle begins each year on January 1.

New students who apply before the February 15 priority date may have a better opportunity for funds (including the most desirable type—gift aid) that are often depleted later in the financial aid cycle. Entering freshmen should contact the Office of Admissions for a *Scholarship and Honors* application. All other students should contact their individual department or college to find out what scholarships are available in particular areas of study. Additional scholarship funds from University departments may be available to students, depending on their major and their academic record.

Students must reapply for financial aid each year after January 1. After their first year, they will be provided with a Renewal FAFSA with pre-filled data, available online, that asks them to update only information that has changed since their last application. Continuing students are encouraged to apply for financial aid by the priority date of March 1 to have their aid ready by fall term and to improve the possibility that they will receive a higher proportion of gift assistance.

Post-Secondary Enrollment Options Program (PSEO) participants must declare those transfer credits to ensure that they receive their maximum Minnesota State Grant award. They should complete the *Minnesota State Grant Additional Information Request* form available online at <www.onestop.umn.edu/Forms> or for pickup in a One Stop Student Services Center. The form asks students to identify all postsecondary or college credit earned as a high school student and to provide a copy of academic transcripts with the terms highlighted in which they were a PSEO student. The Office of Student Finance will deduct these high school quarters or semesters of attendance from students' accumulated state grant eligibility to ensure students get the maximum award amounts.

Visit, Call, or Write

Financial aid assistance is provided year-round at three campus One Stop Student Services Centers to help students through the financial aid application process. All of the centers provide a range of publications and forms for pickup. Full services are provided at the One Stop Student Services Center located in 200 Fraser Hall, 106 Pleasant Street S.E., Minneapolis campus. General office hours are 8:00 a.m.–5:30 p.m., Monday–Thursday, and 8:00 a.m.–4:00 p.m., Friday. Financial aid counseling is available by phone at 612-624-1665 (8:00 a.m.–4:00 p.m., Monday–Friday), 1-800-400-8636 toll-free outside the Twin Cities metropolitan area, or TTY (text telephone for hearing impaired only) 612-626-0701. Students may also see counselors in person on a walk-in basis or by appointment to discuss their concerns, have their questions answered, to review their applications or other forms for completeness, and to obtain any additional forms or application materials that may be needed. In

The University Job Center posts more than 16,000 positions per year (10,000 on campus) and offers a job guarantee program for first-year students.

addition, a self-service computer area allows students to conduct online scholarship searches, complete an online FAFSA application, or review their student accounts. Students may also go to the One Stop Student Services Center in 130 Coffey Hall, 1420 Eckles Avenue, St. Paul campus or in 130 West Bank Skyway, West Bank campus, 8:00 a.m.–4:00 p.m., Monday–Friday.

Send correspondence to:

Office of Student Finance
University of Minnesota, Twin Cities
210 Fraser Hall,
106 Pleasant Street S.E.
Minneapolis, MN 55455-0422

General information (Twin Cities) **612-624-1665**
TTY (for hearing-impaired callers only) .. **612-626-0701**
Fax **612-624-9584**
E-mail ..... **osfa@tc.umn.edu**
Web site ..... **<www.onestop.umn.edu/Finances>**
Student Accounts Receivable **612-625-8500**
Student Loan Collections **612-625-8007**

For FAFSA questions, students may call 1-800-433-3243 or 1-800-801-0576 (TTY for hearing impaired only) or connect to FAFSA on the Web at <www.fafsa.ed.gov> and select the "Check My Submitted FAFSA" tab. Customer service is also available live, online, by selecting the "Customer Service Live" button at the bottom of the Web page. The center can help students through the application process by:

- explaining comments on the Student Aid Report (SAR) and how to make corrections to erroneous or inconsistent information.
- answering technical questions regarding the PIN (personal identification number).
- assisting a student in navigating through the FAFSA Web site.
- confirming application or correction processing and issuing a duplicate SAR.
- identifying the holder of any currently held student loans.

Student Services and Activities

For the most complete listing of resources and student services on the Twin Cities campus, students should refer to the *Gopher Guide*. A good Web site for exploring Twin Cities campus life is <www.onestop.umn.edu/Events>. Highlights of some services and activities are presented below, followed by a directory of resources and services. Check the college and program sections of this catalog for college-specific services.

Boynton Health Service—All University students, staff, faculty, alumni, retirees, and their dependents are eligible to use Boynton Health Service on a fee-for-service basis. Students who pay the student services fee or the extended coverage fee are eligible to receive most services at Boynton at no additional charge and others at reduced cost. Boynton can take care of most non-hospital medical needs, including physician, dentist, or mental health counselor visits; eye examinations; lab tests and x-rays; and prescriptions. For more information, call 612-625-8400 or visit the Boynton Web site <www.bhs.umn.edu>. Boynton offices are located at 410 Church Street S.E. on the Minneapolis campus and at 109 Coffey Hall on the St. Paul campus.

Housing & Residential Life—The University has 11 housing facilities on campus serving about 6,300 individual students: eight residence halls (six on the East Bank, one on the West Bank, and one on the St. Paul campus) and three apartment-style complexes (all three on the East Bank). The Housing & Residential Life office (in Comstock Hall-East, 612-624-2994) also has information about housing units for married/partnered couples and families, including single parents, and about off-campus housing. For housing information on the Web, go to <www.umn.edu/housing>.

Intercollegiate Athletics—Several men's and women's sports are offered. For more information, visit <www.gophersports.com> or call 612-625-4838 for men's programs or 612-624-8000 for women's programs.

Job Center—A variety of on-campus job opportunities are available to students through the Job Center (612-625-2000). Some jobs require little or no experience or training; others require considerable expertise and training. Typical pay for students in these positions ranges between $6.50 and $10.00 per hour. Students can view job opportunities on the Web <www.umn.edu/ohr/jobs/students.html> and contact employers directly. Work-Study positions are available. Job Center staff are available to advise students as they search for jobs.

Recreational Sports—The University offers recreational sports programs and facilities to improve the quality of life for students, staff, and faculty. The Sport Clubs Program offers 26 clubs in a wide variety of competitive and instructional sport activities. The Intramural Program offers nearly 500 leagues and tournaments in 15 sports. The University Recreation Center and the St. Paul Gym offer fitness centers, swimming pools, gyms for basketball and volleyball, running tracks, and courts for tennis, racquetball, handball, and squash. For information, call 612-625-6800 (Minneapolis campus) or 612-625-8283 (St. Paul campus).

Student Activities Office—The Student Activities Office, 825 Washington Ave. S.E., Room 202, (612-626-6919), offers various programming initiatives and learning opportunities, including the events calendar Web site <http://events.tc.umn.edu>, leadership development programs, and support for student groups. For a complete listing of registered student groups, see the *Gopher Guide* or visit the Web site at <www.umn.edu/sao>.

Student Unions—The student unions—St. Paul Student Center and Coffman Memorial Union and its West Bank services—offer lounge and study spaces, dining services, convenience stores, meeting/conference space, game rooms, non-credit art courses, copy centers, postal stations, ATMs, e-mail kiosks, and bookstores. The student unions also sponsor numerous events and activities for the campus community, including films, lectures, concerts, art exhibits, outdoor adventures, and Spring Jam.

Note: Coffman Memorial Union will be closed for renovation through December 2002. Once reopened, Coffman will house the University's new, central 40,000 square-foot bookstore, 24-hour computer lab, 400-seat multi-purpose theater, food court, campus security escort station, study lounges, student organization office space, convenience store, and a bank and other services and facilities for students on the Minneapolis campus. Many student organizations, cultural centers, and University departments have been relocated to 720 Washington Avenue during the renovation; other services have been moved elsewhere on campus. For relocation information, check <www.coffman.umn.edu>. For student union information, call the St. Paul Student Center at 612-625-9794 or visit <www.spsc.umn.edu>. Call 612-624-4636 for more information about Coffman Memorial Union and its West Bank services.

Student Services Directory

(area code 612)

Campus Information

Emergency 911

Escort service 624-WALK

Campus directory assistance

- From off campus, 625-5000
- From on campus, dial 0
- 7:30 a.m.-8:00 p.m., Monday-Saturday; 12:00 noon-8:00 p.m., Sunday

Campus events <events.tc.umn.edu>

- Student Activities Office 626-6919
- Coffman Memorial Union 625-2272
- St. Paul Student Center Union Station 625-9794

University of Minnesota Alumni Association
200 McNamara Alumni Center
624-2323

University of Minnesota Police Department
100 Transportation and Safety Building
511 Washington Avenue S.E.
Non-emergency 624-3550
Emergency 911

Activities, Programs, and Entertainment

Bell Museum of Natural History
624-7083

Coffman Memorial Union program information
625-2272

Events calendar
<events.tc.umn.edu>

Frederick R. Weisman Art Museum
625-9494

The Goldstein Museum of Design
624-7434

Katherine E. Nash Gallery
624-7530

Northrop Auditorium arts ticket office
624-2345

Orientation and First-Year Programs
624-1979

Paul Whitney Larson Gallery
625-0214

School of Music/Ted Mann Concert Hall events hotline
626-8742

Student union activities/events
625-9794

University Film Society hotline
627-4430

University Theatre
120 Rarig Center 625-4001

Admissions

Change of college

- 200 Fraser Hall 625-5333
- 130 West Bank Skyway 626-9110
- 130 Coffey Hall 624-3731

Residency and reciprocity
240 Williamson Hall 625-6330

Transfer information
Contact the individual college admissions office or

240 Williamson Hall 625-2008
8:00 a.m.-6:00 p.m., Monday
8:00 a.m.-4:30 p.m., Tuesday-Friday

Athletics

Men's Intercollegiate Athletics

- Information: 226 Bierman Field Athletic Building 625-4838
- Tickets: East end of Mariucci Arena 624-8080

Recreational Sports

- 108 Cooke Hall 625-6800
- 104 St. Paul Gym 625-8283

Women's Intercollegiate Athletics

- Information: 250 Bierman Field Athletic Building 624-8000
- Tickets: East end of Mariucci Arena 624-8080

Bookstores

East Bank store
Williamson Hall 625-6000

Health Sciences store
Moos Tower 625-8600

Law School store
Law Center 626-8569

St. Paul store
Student Center 624-9200

West Bank store
Anderson Hall 625-3000

Campus newspaper

The Minnesota Daily
2301 University Avenue S.E.
627-4080

Computing services

Computer Helpline 301-4357 (1-HELP)

- 190 Shepherd Labs, East Bank
- 93 Blegen Hall, West Bank
- 50 Coffey Hall, St. Paul

Copying services

Printing Services Copy Centers

- East Bank, B-1 Johnston Hall 625-1092
- East Bank, 147 Smith Hall 625-4390
- East Bank, 130 McNamara Alumni Center 624-7531
- Health Sciences, D-104 Mayo Memorial Building 625-8914
- St. Paul, 8 St. Paul Student Center 625-4771
- West Bank, L-129 CarlSMgmt 624-6588
- West Bank, 33 Social Sciences Building 625-9047

Counseling and Student Services

African American Learning Resource Center
215 Science Classroom Building 625-1363

American Indian Learning Resource Center
125 Fraser Hall 624-2555

Asian/Pacific American Learning Resource Center
315 Science Classroom Building 624-2317

Assessment & Achievement Center
1901 University Avenue S.E., Suite 210
626-1055

Aurora Center for Advocacy & Education
(formerly Program Against Sexual Violence)
24-Hour Crisis Line 626-9111

407 Boynton Health Service 626-2929

Career Development Center
302 Eddy Hall 624-8344

Chicano Latino Learning Resource Center
315 Science Classroom Building 625-6013

College of Continuing Education Student Support Services
150 Wesbrook Hall 625-3333

Disability Services
180 McNamara Alumni Center 626-1333
(voice or TDD)

Diversity Institute
140 Klaeber Court 625-0537

Equal Opportunity Office
419 Morrill Hall 624-9547

Gay, Lesbian, Bisexual, Transgender Programs Office
138 Klaeber Court 625-0537

International Student and Scholar Services
190 Hubert H. Humphrey Center 626-7100

Learning and Academic Skills Center
104 Eddy Hall 624-7546

Mental Health Clinic
N400 Boynton Health Service 624-1444

Minnesota Women's Center
112 Klaeber Court 625-9837

Student Dispute Resolution Center
107 Eddy Hall 625-5900

Student/Parent HELP Center
133/180 Appleby Hall 626-6015

University Counseling & Consulting Services

- 109 Eddy Hall 624-3323
- 199 Coffey Hall 624-3323

University of Minnesota Alumni Association
200 McNamara Alumni Center 624-2323

Urgent Counseling
410 Boynton Health Service 625-8475

Employment

Graduate Assistant Office
200 Donhowe Building
319 15th Avenue S.E.
624-7070

Student Employment
U of M Job Center
170 Donhowe Building
319 15th Avenue S.E.
626-1523, 625-2000

Financial Aid

Student Finance, Office of
200 Fraser Hall 624-1665

130 Coffey Hall 624-1665

Student Loan Collections
140 Williamson Hall 625-8007

Health and Public Services

Aurora Center for Advocacy & Education
(formerly Program Against Sexual Violence)
24-hour crisis line 626-9111

407 Boynton Health Service 626-2929

Boynton Health Service (information)
Minneapolis 625-8400

St. Paul 624-7700

TTY 625-6184

Boynton Health Service (appointments)
- Medical 625-3222
- Eye Clinic 624-2134
- Dental Clinic 624-9998
- Mental Health Clinic 624-1444
- St. Paul 624-7700

Boynton Health Service (emergency)
When Boynton is closed:
- Medical Emergencies 625-7900
- Dental Emergencies 273-3000
- Crisis Connection 379-6363 or 625-7900

Dental School Clinic
Seventh floor, Moos Tower 625-2495

Fairview-University Medical Center
273-3000

University Police
511 Washington Avenue S.E. 624-3550

Women's Health Clinic
Ground floor, Boynton Helath Service 625-3222

Housing

Housing & Residential Life
Comstock Hall-East 624-2994

Residence halls
- Bailey (St. Paul) 624-0700
- Centennial 625-4452
- Comstock 624-1995
- Frontier 624-9999
- Middlebrook (West Bank) 625-0536
- Pioneer 626-3333
- Sanford 624-2526
- Territorial 625-0971
- University Village 625-3909
- Wilkins 624-0044

International Resources

China Center
290 Hubert H. Humphrey Center 624-1002

Global Campus•Study Abroad
230 Heller Hall 626-9000

International Programs, Office of
645 Heller Hall 624-5580

International Service and Travel Center
94 Blegen Hall 626-4782

International Student and Scholar Services
190 Hubert H. Humphrey Center 626-7100

Legal Service

University Student Legal Service
160 West Bank Skyway 624-1001

Libraries

General information 624-0303

Hours recording 624-4552

Bio-Medical Library
270 Diehl Hall 626-5653

Humanities/Social Sciences
Wilson Library 626-2227

Journalism, Eric Sevareid Library
20 Murphy Hall 625-7892

Law Library
Law Center 625-4300

Magrath Library (St. Paul Campus)
1984 Buford Avenue 624-2233

Science and Engineering Library
Walter Library 624-3366

Library Learning Resource Centers
- Bio-Medical Library 270 Diehl Hall 626-4045
- 204 Walter Library 624-1584

University Archives and Special Collections
Andersen Library 625-9825

Personal Services

Automated teller machines
- Blegen Hall basement
- Science Classroom Building
- St. Paul Student Center lower level
- Willey Hall upper concourse
- Williamson Hall lower concourse

Banking services
University of Minnesota Credit Union

170 McNamara Alumni Center 626-0500

Check cashing
- 145 Williamson Hall 625-7535
- 101A Anderson Hall 625-1383
- 107 Coffey Hall 625-8108
- St. Paul Student Center 625-9794
  8:00 a.m.-7:00 p.m., Monday-Friday

Child care
- ***Child Care Center, University***
  East Bank 627-4014
- ***Community Child Care Center***
  1250 Fifield Avenue, St. Paul
  651-645-8958
- ***Como Community Child Care***
  1024 27th Avenue S.E., Mpls. 331-8340

Lost and found
- ***Skyway Service Center***
  West Bank 624-6338
- ***St. Paul Student Center***
  Union Station 625-9794
- ***Student Services Center***
  130 Coffey Hall 624-3731

Notary service
240 Williamson Hall 625-2008

Postal Services
- 2-220 Phillips-Wangensteen Building 625-0981
- Dinkytown, 1311 Fourth Street S.E.
  800-275-8777
- St. Paul Student Center 625-9794
- 130 West Bank Skyway 624-6338
- Williamson Hall main concourse
  (stamp machine)

Recreation

- Recreational sports information 625-6800, 626-9222
- University Rec Center 625-6800
- 104 St. Paul Gym 625-8283
- Center for Outdoor Adventure
  St. Paul Student Center 625-8790
- Gopher Spot
  St. Paul Student Center 625-5246

Registration, Fee Payment, and Student Records

Fee payment, Bursar's Office
- 145 Williamson Hall, East Bank
  625-7535

  8:00 a.m.-5:00 p.m, Monday-Thursday;
  8:00-4:00 p.m., Friday
- 101A Anderson Hall, West Bank
  625-1383

  8:00 a.m.-3:00 p.m., Monday-Friday
- 107 Coffey Hall, St. Paul
  625-8108

  8:00 a.m.-3:30 p.m., Monday-Friday

Paid fee verification
200 Fraser Hall 625-8500

One Stop Student Services Centers
Registration, transcripts, records problems
- 200 Fraser Hall 625-5333
- 130 Coffey Hall 624-3731
- 130 West Bank Skyway 626-9110

Student Groups

- Student Activities Office 626-6919

Transportation Information

Bikes, buses, and parking
300 Transportation & Safety Building
626-7275

Commuter (bus) cards
- 2-200 Phillips-Wangensteen Building 625-0981
- University Bookstore, Williamson Hall
  625-6000
- St. Paul Student Center, Union Station 625-9794
- West Bank Skyway Service Center
  624-6338

Metro Transit buses 373-3333

Motorist Assistance Program 625-5533

Policies

Policies

The University of Minnesota has many policies pertaining to academic work and student life on campus. Students are responsible for complying with these policies. The following is a guide to policies that are relevant to undergraduates; it is not a compilation of all policies or their word-for-word presentation. In general, these policies are effective for students who enrolled fall 1999 or after. Students who enrolled under the quarter system but will graduate under semesters should check with their advisers about reconciliation of quarter and semester policies.

Many University policies can be found on the Web <www.fpd.finop.umn.edu>. If students have questions about these and other requirements, they should check with their advisers or college or department offices.

Academic Integrity

Students, faculty, and staff are expected to uphold the highest standards of academic integrity. The Office for Student Academic Integrity (OSAI) is a central resource that promotes scholastic responsibility and skill on the part of individual students; aids faculty and instructional staff in providing a positive learning environment through the prevention and detection of cheating; and serves as a centralized forum for the fair and even-handed resolution of reported cases of student scholastic dishonesty. For more information, see the OSAI Web site <www.osai.umn.edu> or call 612-624-6073.

See also **Conduct Code** and **Grievance.**

Absences

Students are expected to attend all meetings of their courses. They may be excused from class, however, to participate in religious observances. Students are responsible for notifying instructors at the beginning of the term about such planned absences.

Students must attend the first class meeting of every course in which they are registered, unless they obtain approval before the first meeting. Otherwise, they may lose their place in class to another student. For details, check the *Class Schedule*.

See also **Leave of Absence.**

Academic Progress

All colleges and programs require students to make satisfactory academic progress toward their degree. The U.S. Department of Education and the state of Minnesota also require the University to verify that students receiving federal or state financial aid maintain satisfactory progress. Academic progress is also monitored to identify students who perform with distinction.

Students' progress is monitored each term and annually by the college of enrollment. Term monitoring is based solely on GPA. The annual review may also include *coefficient of completion* in conjunction with GPA. The coefficient of completion is defined as credits graded A, B, C, or S divided by credits graded A, B, C, S, D, F, N, or I. Plus or minus modifiers are not included in determining coefficient of completion.

See also **Probation**.

Academic Progress Audit System (APAS)

Each student has an individualized APAS report generated each term. The report compares past and current coursework with the requirements for the student's academic program. Advisers can help students understand the various sections of the report and plan a course of study to satisfy degree requirements. Copies are available in One Stop Student Services Centers located in 200 Fraser Hall, 130 West Bank Skyway, or 130 Coffey Hall or online at <http://onestop.umn.edu/dars>. A sample APAS report and more details are available in the *Class Schedule*.

Access to Educational Records

In accordance with regents' policy on access to student records, information about a student generally may not be released to a third party without the student's permission. (Exceptions under the law include state and federal educational and financial aid institutions.)

Some student information—name, address, electronic (e-mail) address, telephone number, dates of enrollment and enrollment status (full time, part time, not enrolled, withdrawn and date of withdrawal), college and class, major, adviser, academic awards and honors received, and degrees earned—is considered public or directory information. Students may prevent the release of public information. To do so, they must notify the records office on their campus.

Students have the right to review their educational records and to challenge the contents of those records. The regents' policy is available for review on the Web <www.onestop.umn.edu/registrar/Grades /gradereporting>, at 200 Fraser Hall, Minneapolis, and at records offices on other campuses of the University. Questions may be directed to the One Stop Student Services Center, 200 Fraser Hall (612-625-5333).

Students are responsible for updating their personal information, which can be done online <www.onestop.umn.edu/Student>.

Advising

Academic advising is a crucial component of the University's educational mission. Although the approach to advising varies among colleges and departments, these general principles apply:

- Academic advising is available to all students.
- Students are encouraged to see their adviser before registration each term.
- Academic advising addresses students' needs in coursework, program planning, career options, and development issues.
- Faculty, professional advisers, graduate students, and peers are involved in academic advising.

Students should expect academic advisers to assist them in designing and implementing a program of study and related activities that will allow them to achieve their educational goals. Advisers expect students to prepare for program planning sessions by giving careful thought to possible course selections, program schedules, and short- and long-term education and career goals, and to come to appointments with pertinent academic records and materials. (See Advising in the General Information section of this catalog.)

Auditing

Students auditing a course pay full tuition, but do not take exams, do homework, or receive credit. A student may take a previously audited course for credit.

Change of College

Students who wish to transfer from one college of the University to another must submit a completed *Application for Change of College* to the One Stop Student Services Center (200 Fraser Hall, 130 West Bank Skyway, or 130 Coffey Hall). Deadlines are available in

the *Class Schedule*. See also the registrar's Web site <www.onestop.umn.edu/registrar/majors/change_colleges.html>. College offices can provide information on admission requirements.

Change of Registration

Details about adding and canceling courses, changing grading options, or making other post-registration changes are available in the *Class Schedule.* See also the registrar's Web site <www.onestop.umn.edu/registrar/registration/changing.html>.

Class Standing

A student's class standing is determined by the number of semester credits completed: freshman, 1-30 credits; sophomore, 31-60 credits; junior, 61-90 credits; senior, 91 or more credits.

Conduct Code

Students are responsible for complying with the University's Student Conduct Code, which is available in college student affairs offices and Student Judicial Affairs, 612-624-6073. The code is published regularly and also available on the Web at <www.sja.umn.edu>. See also **Academic Integrity** and **Grievance**.

Course Numbering

Courses have four-digit numbers. The first number designates the course level.

0xxx	Courses that do not carry credit toward any University degree.
1xxx	Courses primarily for undergraduate students in their first year of study.
2xxx	Courses primarily for undergraduate students in their second year of study.
3xxx	Courses primarily for undergraduate students in their third year of study.
4xxx	Courses primarily for undergraduate students in their fourth year of study; graduate students may enroll in such courses for degree credit. 4xxx courses can be counted for a Graduate School degree if the course is taught by a member of the graduate faculty or an individual appointed to Limited Teaching Status (LTS).
5xxx	Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.
6xxx	Courses for postbaccalaureate students in professional degree programs.
7xxx	Courses for postbaccalaureate students in professional degree programs. 6xxx and 7xxx courses are to be used primarily for postbaccalaureate professional programs that are not offered through the Graduate School.
8xxx	Courses for graduate students.
9xxx	Courses for graduate students.

Credit by Examination

The University offers proficiency examinations and special examinations for credit at the discretion of academic departments. Likewise, the University recognizes and awards credits based on examinations that are taken as part of the Advanced Placement Program, the International Baccalaureate Program, and the College Level Examination Program. (See Transfer Admission in the General Information section of this catalog.)

Credit Limits

No student may enroll for more than 20 credits per semester without college approval. Some colleges or programs may set a minimum credit limit. For more information, students should check with their adviser.

Credit Load

Undergraduates must complete at least 15 credits per semester to graduate within four years.

13-Credit Requirement—This requirement is being phased in over three years. Phase one: Degree-seeking students whose first term of enrollment as a new freshman or a new transfer at the University is fall semester 2002 or later are required to register for at least 13 credits each semester. Phase two: Effective fall semester 2005, all degree-seeking students will be required to register for at least 13 credits each semester. To apply for part-time status, or to take fewer credits temporarily, students must petition their college. More information can be found at <www.onestop.umn.edu/13credits/index.html>.

The course registration queue gives priority to students whose immediately previous registration was "full-time" (i.e., for at least 13 credits). Under the queue, full-time seniors register first, followed by part-time seniors, full-time juniors, part-time juniors, full-time sophomores, etc. More information about the queue can be found at <www.onestop.umn.edu/newqueue /index.html>.

Dean's List

Each semester, all colleges and programs publish a dean's list, which includes students who achieve a 3.67 GPA or higher and who complete at least 12 credits. This achievement is noted on students' transcripts.

Declaring a Major

Students in freshman-admitting colleges may have an *undeclared* major for a limited time. Colleges and programs have different procedures for students to declare a major, but all students must declare a major or be accepted into a program before or upon completing 60 semester credits. Undeclared students with 60 or more credits will have a registration hold and will not be allowed to register without first meeting with their adviser and gaining college approval.

Diplomas

Diplomas are issued three times a year (fall, spring, summer) to students graduating with bachelor's degrees. One diploma is issued for each degree. Honors are noted on the diploma, but college and majors are not. Diplomas are mailed approximately three months after graduation. For details on graduation, see the *Class Schedule* or call the Office of the Registrar (612-625-5333).

Discretionary Course Cancellation or Withdrawal

Students are permitted **one discretionary course cancellation**, or withdrawal, at any time up to and including the last day of class for that course. This discretionary cancellation may be used only once during a student's enrollment at the University. Students must notify their college to use this withdrawal, but college approval is not required. A "W" is recorded on the student's transcript.

For more information about withdrawal from a course, see **Grading and Transcripts** on page 29. Information about course cancellation procedures, deadlines, and refund information can be found in the *Class Schedule*.

E-Mail

E-mail is the University's official means of communication with students. Students are responsible for all information sent via their University e-mail account. Students who forward their University e-mail account are still responsible for all the information, including attachments, sent to the account.

Equal Opportunity

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

In adhering to this policy, the University abides by the Minnesota Human Rights Act, Minnesota Statute Ch. 363; by the Federal Civil Rights Act, 42 U.S.C. 2000e; by the requirements of Title IX of the Education Amendments of 1972; by Sections 503 and 504 of the Rehabilitation Act of 1973; by the Americans With Disabilities Act of 1990; by Executive Order 11246, as amended; by 38 U.S.C. 2012, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

Inquiries regarding compliance may be directed to Julie Sweitzer, Director, Office of Equal Opportunity and Affirmative Action, University of Minnesota, 419 Morrill Hall, 100 Church Street S.E., Minneapolis, MN 55455 (612-624-9547).

Extracurricular Events

No extracurricular events requiring student participation may be scheduled from the beginning of study day to the end of finals week. Exceptions to this policy may be granted by the Senate Committee on Educational Policy. The Senate advises all faculty that students who are unable to complete course requirements because of approved events during finals week will be provided an alternative and timely opportunity to do so.

Final Exams

The *Class Schedule* includes detailed information each term about final exam schedules and policies.

Four-year Graduation Plan

The Four-year Graduation Plan offers a structured program for incoming freshmen to graduate in four years. A complete set of eligibility rules and eligible majors is listed in the information packet sent to all new freshmen and is on the Web at <www.irr.umn.edu/fouryear/>.

Students on the plan must meet the eligibility requirements when they enter the University and must plan their program with the assistance of their adviser. Checkpoint course guides have been set up for degree programs on the Four-year Graduation Plan to help students stay on track. The checkpoint course guides are available on the Web at <www.irr.umn.edu/fouryear /alphachk.htm> to help students plan their degree program.

If a student cannot get into a required course, he or she must notify an adviser within two days of the assigned registration date by filing a *Notification of Unavailable Course*. If a required course is unavailable, the University will arrange for additional course seats, substitute another course, give priority registration during the next registration period, or waive the requirement, at the University's option. If the University's inability to provide a required course causes a student to graduate beyond four years, the University will cover the tuition cost of the additional required courses. For more information, see page 13 in the General Information section or call 612-625-2525.

Full-time Student Status

To graduate in four years, a student must complete at least 15 credits each semester. State financial aid also defines full-time status as 15 credits. Maximum need-based federal financial aid is available to students who enroll for 12 credits, but note that one cannot graduate in four years by taking only 12 credits a semester.

See also **Credit Load.**

Grading and Transcripts

The complete University Senate grading policy can be found on the Web <www.umn.edu/usenate/policies /gradingpolicy.html>. More information about transcripts can be found in the *Class Schedule* or on the Web at <www.onestop.umn.edy/registrar/transcripts/>.

1. The policy has been in effect since fall 1997 for the Crookston, Morris, and Twin Cities campuses, replacing all previous grading policies. It may not be applied retroactively to any grades or symbols awarded before that time.
2. The University has two grading systems, A-B-C-D-F (with pluses and minuses) and S-N. Students may receive grades only from the grading system under which they have registered for a course.

   Each campus, college, and department determines to what extent and under what conditions each grading system is used, may specify what courses or proportion of courses must be on one system or the other, and may limit a course to either system.
3. When both grading systems are available, students must choose one when registering for a course. See the *Class Schedule* for deadlines related to selecting a grading option.
4. Instructors must clearly define for a class, at one of its earliest meetings, the performance necessary to earn each grade or symbol.
5. No student may receive a bachelor's degree unless at least 75 percent of the degree-qualifying residence credits carry grades of A, B, C, or D (with or without pluses or minuses). Each campus, college, and department may choose not to accept academic work receiving a D (with or without a plus or minus).
6. The University's official transcript, the chronological record of the student's enrollment and academic performance, is released by the University only at the student's request or in accord with state or federal statutes; mailed copies have the University's official seal printed on them. Students may obtain an unofficial transcript, except when they have a transcript hold on their record.
7. The University calculates a grade point average (GPA) for each student, both at the end of each grading period and cumulatively. GPA is calculated as the ratio of grade points earned divided by the number of credits earned with grades of A-F (including pluses and minuses). Transcripts report the periodic and cumulative GPA for each term.
8. A student may repeat a course once. Both grades for the course appear on the transcript, but the course credits may not be counted more than once toward degree and program requirements. Only the last enrollment for the course counts in the student's grade point average.
9. Students may petition the college scholastic committee or other appropriate body about this policy up to one calendar year after the grade was assigned.
10. The grades on page 30 (with grade points as indicated) and symbols are used on transcripts.

A 13-credit minimum per semester is being phased in over three years. Check <www.onestop.umn.edu/13credits/> for more information.

Grading Policy

A ..... 4.00 ..... Represents achievement that is outstanding relative to the level necessary to meet course requirements.

A- 3.67

B+ ... 3.33

B ..... 3.00 ..... Represents achievement that is significantly above the level necessary to meet course requirements.

B- 2.67

C+ ... 2.33

C ..... 2.00 ..... Represents achievement that meets the course requirements in every respect.

C- 1.67

D+ ... 1.33

D ..... 1.00 ..... Represents achievement that is worthy of credit even though it fails fully to meet the course requirements.

S ..... Represents achievement that is satisfactory (equivalent to a C- or higher and meets or exceeds course requirements in every respect). The S does not carry grade points and is not included in GPA calculations, but the credits count toward the student's degree program if allowed by the department.

F or N ..... Represents failure or no credit and indicates that coursework was completed but at an achievement level unworthy of credit, or was not completed and there was no agreement between the instructor and student that the student would be awarded an I. Academic dishonesty is grounds for an F or N for the course. The F carries 0.00 grade points and is included in GPA calculations; the N does not carry grade points and is not included in GPA calculations.

I ..... Incomplete, a temporary grade that indicates coursework has not been completed.

The instructor assigns an I when, due to *extraordinary* circumstances, a student is prevented from completing coursework on time. An I requires a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements during the student's next term of enrollment.

For undergraduates and non-degree seeking students, work to make up an I must be submitted within one year of the last final examination of the student's next term of enrollment; if not submitted by that time, the I will automatically change to an F (if A-F registration) or N (if S-N registration).

The instructor is expected to turn in the new grade within four weeks of the date work is submitted.

When an I is changed to another symbol, the I is removed from the record. Once an I has become an F or N, it may be converted to any other grade by petition of the instructor (or department if the instructor is unavailable).

K ..... Indicates the course is still in progress and a grade cannot be assigned at the present time.

T ..... Transfer, a prefix to the original grade that indicates credits transferred from another institution or from one University college or campus to another.

V ..... Visitor, indicates registration as an auditor or visitor; does not carry credit or grade points.

W ..... Withdrawal, indicates a student has officially withdrawn from a course. If a student withdraws from a course during the first two weeks of classes, that course registration is not recorded on the student's transcript. The W is recorded if the student withdraws from the course during the third through sixth week of class (second or third weeks of summer terms). Withdrawal in the seventh or later week of classes (fourth or later in summer terms) requires college approval.

Each student may, once during his or her under-graduate enrollment, withdraw from a course without college approval, and receive a W, at any time up to and including the last day of class for that course.

X ..... Indicates a student may continue in a sequence course in which a grade cannot be determined until the full sequence of courses is completed. The instructor submits a grade for each X when the student completes the sequence.

Graduation, Applying for

In general, Twin Cities campus undergraduate degree applications are due by the end of the first week of the semester of graduation. For details, see the *Class Schedule*. See also the registrar's Web site <www.onestop.umn.edu/registrar /Graduating/info.html>.

Graduation Requirements

Colleges and programs specify degree requirements, but the following graduation requirements apply to all undergraduates:

- Students who are admitted to a degree program or major and who complete all campus, college, and program requirements with a minimum GPA of 2.00 in the major and a cumulative GPA of 2.00 or higher in all University coursework will be allowed to graduate.
- All degree programs require a C- or better in each course in the major.
- Students must have at least 30 semester credits from the University, including 24 credits taken after declaration of or admission to the major or program and taken from the college offering the major or program. Of the last 30 credits earned before graduation, at least 15 must be awarded by the University.
- No more than 6 semester credits from physical education, study skills, or applied music (in any combination) will count toward a student's degree, unless additional credits are a required part of a student's program requirements; i.e., no more than 6 credits total from these areas will count toward the degree.

Any course that carries University credit in one department or college will carry University credit in all other University departments or colleges, at least as an elective, including all transfer coursework that is accepted when a student is admitted. Some courses that carry University credit may not count toward college or department/program degree requirements, or may, if a student changes programs, exceed the limit of 6 credits from the areas identified in the preceding paragraph and thus not count toward the degree.

Graduation With Distinction or With Honors

Some colleges offer degrees with distinction and with honors. Students should check with an adviser to determine if their college offers either or both of these degree awards. To qualify for either, a student must have completed 60 or more semester credits at the University. Only University coursework is considered in determining GPA for distinction or honors. For details on honors programs, check the college and program sections of this catalog.

To graduate *with distinction*, a student must have a cumulative GPA of 3.75 or higher at graduation. To graduate *with high distinction*, a student must have a cumulative GPA of 3.90 or higher.

To graduate *with honors*, students must participate in a fully developed honors program in their college or program, complete a designated amount of coursework, achieve a stipulated GPA, and achieve a definite standard of excellence in scholarship with specific evidence of ability to accomplish independent or original work. Further, the minimum GPA in upper division (i.e., the last 60 graded semester credits) required for achievement of a degree *cum laude* is 3.50; *magna cum laude* is 3.66; *summa cum laude* is 3.75. Details on graduating with honors are available from college honors programs.

Grievance

Academic grievances are complaints brought by students regarding the University's provision of education and academic services affecting their role as students. A step-by-step process, moving from informal to formal resolution is described in the Student Academic Grievance Policy <www.umn.edu/usenate

/policies/stugrieve.html>. Students should also check with the Student Dispute Resolution Center Web site <www.tc.umn.edu/~sos> or call 612-625-5900 for assistance.

Grievances by student employees or other employees of the University are handled through the University Grievance Office, 658 Heller Hall (612-624-1030).

Matters arising from student misconduct or actions taken under the Student Conduct Code are the responsibility of Student Judicial Affairs (612-624-6073). Student Judicial Affairs provides a forum for resolution of such issues within the services of its own office and through consultation and advisement of colleges, individuals, and administrative units within the University. Whenever possible, conduct complaints are handled on an informal, person-to-person basis with emphasis on educational development.

Complaints alleging discrimination in the University/student relationship, including student complaints alleging sexual harassment by University staff or faculty, are handled by the Office of Equal Opportunity and Affirmative Action, 419 Morrill Hall (612-624-9547).

Holds

Students who have holds on their records may not register or, in many cases, obtain transcripts until the holds are cleared with the office imposing the holds. A hold may be imposed for financial indebtedness to the University (e.g., for unpaid tuition or library fines, or delinquent health service payments) or for disciplinary or scholastic reasons.

Students are usually notified of an existing or impending hold by the department or office authorizing the hold. Notice of any hold, including the name of the department or office where it may be cleared, is available online at <www.onestop.umn.edu/registrar/registration/holds.html> or from the Gopher Student Line at 612-624-5200.

Honors

Many undergraduate colleges offer honors programs. See Admissions in the General Information section and the college sections of this catalog for more information.

See also **Graduation With Distinction or With Honors**.

Hospitalization Insurance

Students taking 6 or more credits, or those who purchase an extended coverage benefits plan through Boynton Health Service, are required to carry hospitalization insurance. Students who enroll for 6 or more credits and do not have hospitalization insurance will automatically be enrolled in a University-sponsored plan when they register. Students who already have insurance through their parents, employer, or spouse will need to provide documentation of coverage during registration to avoid being charged for the University-sponsored plan. For more information, see the *Class Schedule* or call Boynton Health Service (612-624-0627).

Immunization

Students born after 1956 who take more than one University class are required under Minnesota law to submit an *Immunization Record.*

The form, which is sent along with the official University admission letter, must be filled out and returned to Boynton Health Service within 45 days of the first term of enrollment in order for students to continue registering for classes.

Incompletes

See **Grading and Transcripts**.

Leave of Absence

Each college has a leave of absence policy for students who plan to leave school for more than two semesters. Students who follow the policy and whose leave is approved need not apply for readmission when they return. Colleges may condition readmission on availability of space in a program provided that they caution students that readmission will be so conditioned. Colleges must inform students who request a leave whether they will be held to old or new program requirements upon their return. If a leave is for more than two academic years, the student must follow new program requirements.

See also **Readmission.**

Liberal Education Requirements

The following requirements apply to students enrolling at the Twin Cities campus fall 1999 or later. Each semester, the *Class Schedule* publishes the requirements and lists courses that count toward the liberal education requirements. This information also is available on the Web <www.onestop.umn.edu/registrar/libed>. In addition, the *Class Schedule* lists which courses are offered for a particular semester and which are tentatively scheduled for subsequent terms during the academic year. The online version of the *Class Schedule* is available at <www.onestop.umn.edu/schedule/html/tc.html>.

The list of courses that can be used to satisfy liberal education requirements changes often. For the most up-to-date information, check the Web at <www.onestop.umn.edu/registrar/libed>.

A liberal education introduces students to the modes of inquiry and subject matter of the major branches of knowledge, including the factual information and theoretical or artistic constructs that form their foundations; the "ways of knowing" (i.e., the kinds of questions asked and ways in which insight, knowledge, and data are acquired and used); the changes over time of their central ideas or expressive forms; and the interrelationships among them and human society in general. To these ends, study by all undergraduate students on the Twin Cities campus is guided by a common framework.

The Diversified Core Requirements

Physical and Biological Sciences—a minimum of two courses totaling at least 8 credits, including one course in physical science with a laboratory or field experience, and one course in biological science with a laboratory or field experience.

Social Science and Humanities—a minimum of 15 credits distributed as follows:

Social Science—at least 6 credits.

Humanities—at least 6 credits, including one course in literature and one course in "other humanities." (The "other humanities" category includes courses in philosophy, visual or performing arts, and other humanities or arts.)

Historical Perspective—at least 3 credits.

Mathematical Thinking—one course of at least 3 credits.

The Designated Themes of Liberal Education

The designated themes of liberal education offer a dimension to liberal learning that complements the diversified core curriculum. Each of the themes focuses on an issue of compelling importance to the nation and the world, the understanding of which is informed by many disciplines and interdisciplinary fields of knowledge.

Requirement: A minimum of one course of at least 3 credits in each of the following:

Environment
Cultural diversity
International perspectives
Citizenship and public ethics

Some diversified core courses also meet one theme requirement. Other courses may satisfy two theme requirements. Students who have completed the required coursework in the diversified core or designated theme areas but are missing one credit in either may apply for a one-credit waiver. Detailed information is available in the *Class Schedule*.

Writing Requirement

This requirement is effective fall 1999 for freshmen, fall 2001 for transfers. One or two first-year writing courses are required, depending on the student's college of enrollment. Four writing intensive courses are required. Two of the courses must be upper division courses, one of which should be taken in the student's major.

Minnesota Transfer Curriculum

If students complete the Minnesota Transfer Curriculum (MTC) at any participating Minnesota college or university, they fulfill the University's Twin Cities campus liberal education requirements. Students completing the MTC will have completed the first-year writing requirement. The writing intensive requirement is separate from the MTC; however, transfer courses might count as writing intensive. For more information on using transfer credits for the liberal education requirements, contact the Office of Admissions (612-625-2008). College advising offices also have information about these requirements.

Prerequisites

Students should take only those courses for which they have satisfied all prerequisites. Instructors may require students to withdraw from a course if they have not met prerequisites. Instructors may, however, grant permission for a student to take a course without having satisfied prerequisites.

Probation

Undergraduates are placed on academic probation if either their term GPA or their cumulative GPA is below 2.00. They remain on probation until both GPAs are 2.00 or above. They are suspended if, while on probation, their cumulative or term GPA is or goes below 2.00 for two consecutive semesters.

Students on probation are not allowed to register for courses without permission from their adviser or college office. They may be given permission from their adviser to register at the queued time. Students on probation also must complete a contract for academic performance, developed by their college of enrollment.

If students meet the terms of their contract and their term and cumulative GPAs are at least 2.00, they will be removed from probation and allowed to register. If the contract goals are met but their cumulative GPA is still less than 2.00, they will remain on probation. If goals are not met, students will be suspended.

When suspended, students are no longer in their program and cannot register for University courses for one full academic year. Following the suspension period, students must petition the college to return according to a defined collegiate petition process. Students who do not register for three or more semesters and who have not filed a leave of absence form must follow the same procedures.

Upon returning to a college or program, students who were suspended will have a new contract and probationary status. If they do not successfully complete the contract, they will not only be suspended again but also will have to reapply for admission to the University. See **Readmission**.

Students may appeal suspension decisions to their college's Student Scholastic Standing Committee (SSSC). **Readmission after a year's suspension is not automatic.** To be readmitted, students must petition the SSSC in writing and show evidence of changes in circumstances that demonstrate that they will succeed in an academic program.

Readmission

Undergraduates who have not been granted a leave of absence and who do not register for two consecutive semesters will be placed on *inactive* status. To regain *active* status, students must contact their college office for approval. Students in good academic standing at the time they became inactive are routinely allowed to return to active status if there is space in the program.

A student who has left the University without a leave of absence for more than two consecutive semesters (not including summer session) will be held to new program requirements upon his or her return. A student returning after only one year out or less will be allowed to follow the program requirements in effect when he or she was last enrolled. Exceptions may be made only for students who are returning after a formal leave of absence.

Repetition of Courses

See **Grading and Transcripts**.

Residence Requirements for Graduation

See **Graduation Requirements**.

Retention of Student Records

College-specific student records are kept for seven years following a student's last registration. For more information about records retention, see <http://recmgmt.finop.umn.edu /retention.htm>.

Smoke-free Campus

Smoking is prohibited in all facilities of the University of Minnesota, Twin Cities campus except for designated private residence hall rooms.

Student Responsibilities

Students are responsible for complying with policies in this catalog and other policies of the University. Advisers and staff are available to provide guidance, but students are responsible for their choices, including selecting courses that fulfill requirements for their academic programs.

Student Right-to-know Act

Under federal law, students may receive, on request, information about campus security and about graduation and retention rates at the Twin Cities campus from the One Stop Student Services Centers, 200 Fraser Hall, 130 West Bank Skyway, or 130 Coffey Hall.

Suspension

See **Probation**.

Transcripts

See **Grading and Transcripts** and the *Class Schedule*.

Transfer of Credit/Credit Evaluation

See Admissions in the General Information section of this catalog.

Undeclared Major

See **Declaring a Major**.

Withdrawal From a Course

See **Discretionary Course Cancellation** and change of registration information in the *Class Schedule*.

Withdrawal From the University

See **Leave of Absence.**

College of Agricultural, Food and Environmental Sciences

This is the College of Agricultural, Food and Environmental Sciences section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Degree Programs and Minors

College of Agricultural, Food and Environmental Sciences

General Information

Since the 1880s, thousands of students have come to study at the College of Agricultural, Food and Environmental Sciences (COAFES). The stature of the college and its programs has attracted an excellent faculty and student body. It is consistently ranked among the top colleges of agriculture in the United States. In 2001-2002, more than 1100 students were enrolled in COAFES undergraduate programs. The student body has a near equal split of women and men. The college's majors represent a broad spectrum of programs in the applied sciences of soil, plant, animal, food and environment, education, communication, business, and the social sciences. As the college prepares for the future it has undertaken a comprehensive planning process. Under the overarching priority of emphasizing exemplary education for undergraduate and graduate students, the five goals are:

- Promoting safe and healthy foods,
- Improving environmental quality,
- Enhancing agricultural systems,
- Revitalizing Minnesota's rural communities, and
- Serving urban communities.

COAFES is located on the St. Paul campus. The Minnesota Agricultural Experiment Station borders the campus and supports a comprehensive research program. The experiment station provides a sizable teaching laboratory for undergraduate and graduate education.

The goal of COAFES is to provide students with varied educational experiences and an environment that promotes professional competence, the capacity to attain career success in agriculture (including food or related professions), and a sense of social responsibility.

Admission

Requirements for admission to COAFES for high school graduates, non-degree seeking students, and transfer students are explained below. For more information, call COAFES Admissions, 612-624-3045 or 1-800-866-AGRI (toll-free).

Deadlines—The Office of Admissions typically accepts applications for fall semester beginning October 1 of the preceding year and admits students as long as space is available. Freshman applicants who meet the admission requirements and apply by December 15 are guaranteed space in the following fall semester class. Final deadlines are June 1 for fall semester and October 15 for spring semester.

High School Graduates—High school graduates need to complete the University's high school course preparation requirements (see Freshman Admission in the General Information section of this catalog).

Transfer Students—Students may apply for admission to COAFES from other colleges or universities. Applicants may be accepted if they meet the entrance requirements of COAFES and of the major they wish to enter. Transfer applicants who graduated from high school during 1987 or later must have

- passed intermediate algebra with a grade of at least C;
- at least a C average in transfer coursework;
- demonstrated a solid foundation in math and science;
- completed other high school preparation requirements, including foreign language. (See High School Course Preparation on page 17.)

Applicants who did not complete this coursework during high school may submit equivalent college coursework. COAFES may admit some students who have not met these requirements. Students who are admitted but lack preparation requirements must complete all deficiencies early in their program.

Applicants who graduated from high school before 1987 must meet current entrance standards except for the high school preparation and foreign language requirements.

After a transfer applicant has been accepted as a student, the Office of Admissions and COAFES evaluates all previous college work according to the standards of the University and COAFES. The student is then provided with a Transfer Credit Evaluation showing how previous work has been evaluated.

Transfer students must complete all specific course and area distribution requirements of COAFES regardless of the number of credits accepted for transfer. Therefore, students who begin degree work elsewhere and intend to transfer later should carefully plan pre-transfer courses to meet as many COAFES requirements as possible.

Note: A maximum of 4 internship or practical experience credits may be transferred into COAFES.

Change of College Within the University—To transfer to COAFES from another college within the University, students must meet COAFES entrance requirements. Students must complete an *Application for Change of College* and apply for transfer at the Registration Center on the campus where they are currently registered or where they last attended classes. Application deadlines are consistent with posted University admission deadlines.

Non-degree Seeking—Non-degree seeking admission is primarily for students who are pursuing coursework in COAFES departments, but not seeking a degree or for students who are preparing to apply to a graduate program offered by COAFES departments but have prerequisites to satisfy. Admission may be processed at any time before the first day of class. The non-degree seeking category is also open to staff members in COAFES departments taking courses through the Regents Scholarship Program and COAFES graduates returning for coursework.

Students who enter COAFES as non-degree seeking students with the intention of transferring later to the Graduate School should be aware of restrictions on the number of non-degree seeking credits that may be transferred to a graduate program. See the *Graduate School Catalog*.

Finding your way around the college

Interests	*COAFES majors*	*Occupations*	*Primary COA departments*
Animals	AIM, APS, BAE, ScAg	Animal breeder, designer of animal housing, animal nutritionist, dairy inspector, equipment designer	Animal Science; Biosystems and Agricultural Engineering
Animal production (beef, dairy, poultry, swine)	AIM, APSI, ScAg, AgEd	Livestock production specialist, farm manager, animal nutrition consultant for feed company, artificial insemination technician, representative for breeding and registry associations, animal equipment technician, meat industry representative, inspector	Animal Science; Agricultural Education
Biotechnology	BAE, FdSc, ES, ScAg	Lab technician, scientist, bioremediation specialist	Agronomy & Plant Genetics; Biosystems and Agricultural Engineering; Animal Science; Food Science & Nutrition; Horticulture; Soil, Water, and Climate
Business and financial management	AIM, AgBu, ApEc, AgEd	Loan officer, commodity merchandiser, sales representative, market analyst, government adviser, operations manager, food/grain broker, accounts specialist, financial planner, administrative manager, plant manager, farm manager, general manager	Applied Economics; Agricultural Education
Communication	AgEd, AIM, STC	Group process facilitator, interviewer, extension specialist, educator, state and county fair manager, agricultural journalist, public relations specialist, breed association and special interest groups promotion and public relations	Agricultural Education, Rhetoric
Environmental horticulture (landscape, nursery floriculture)	EH	Landscape design and management, nursery/garden center management and production, floral designer flower and foliage grower	Entomology; Horticultural Science; Plant Pathology; Soil, Water, and Climate
Environmental science	AgEd, BAE, ES, ScAg	Soil scientist, environmental protection analyst, waste manager, recycling specialist, environmental scientist, bioremediation specialist, teacher	Agricultural Education; Biosystems and Agricultural Engineering; Soil, Water, and Climate
Field crop production (corn soybeans, wheat, oats, barley, sunflowers, hay, flax)	AIM, CSPM, ScAg AgEd	Seed producer/conditioner, agronomist, crop consultant, farmer, elevator/co-op manager, regulatory agent, plant protection representative, horticulturalist, crop production specialist, seed technologist, machinery and systems designer	Biosystems and Agricultural Engineering; Agronomy & Plant Genetics; Entomology; Plant Pathology; Soil, Water, and Climate
Food	FdSc	Food product developer, production manager quality control supervisor, food inspector, technical service representative	Food Science and Nutrition
Food processing and food safety	BAE, FdSc	System designer for handling and preparing food, engineer for transporting and storing grain and feed, packaging consultant, plant manager	Biosystems and Agricultural Engineering; Food Science and Nutrition
Horticultural food crops (fruits, vegetables)	AIM, CSPM, ScAg	Vegetable grower, orchard manager, greenhouse or garden center worker, nursery stock producer, plant breeder, arboretum assistant, bedding plant grower	Agronomy & Plant Genetics; Horticultural Science; Soil, Water, and Climate
Human nutrition	Nutr	Dietitian, nutrition educator, hospital consultant, medical student	Food Science and Nutrition
Insects	AIM, CSPM, EH, ScAg	Crop/environmental consultant, research biologist, biological control specialist, technical/sales representative, public health inspector, commercial honey producer, plant health care specialist	Entomology, Plant Pathology
International agriculture	AgBu, AgEd, AIM ApEc, FdSc, Nutr	Peace Corps volunteer, agricultural development specialist, international trade economist	Applied Economics; Agricultural Education; Food Science and Nutrition
Landscape design	EH, PreLA	Landscape architect, site planner, urban planner, recreation consultant, landscape designer	Horticultural Science; Landscape Architecture (CALA)
Plants	AIM, CSPM, EH, ScAg	Plant breeder, nursery/greenhouse manager, plant health care specialist	Agronomy & Plant Genetics; Entomology; Horticultural Science; Plant Pathology; Soil Water, and Climate
Sales and marketing	AgBu, ApEc, AIM, AgEd, FdSc	Company sales representative, seller of products to farmers, seller of agricultural products to food companies, inventory controller, district sales manager, advertiser, training and development personnel, technical sales	Applied Economics; Agricultural Education; Food Science Nutrition; Rhetoric
Soil and water resources	BAE, CSPM, ES, ScAg	Pollution control agent, land/water use planner, waste manager, fertilizer sales representative, landscape designer, irrigation and drainage system designer, conservationist, soil scientist	Applied Economics; Agricultural Education; Biosystems and Agricultural Engineering; Soil Water, and Climate
Teaching	AgEd	Middle, high school, or adult agriscience/agribusiness teacher; natural resources, horticulture, agrimechanics teacher; extension educator; Peace Corps volunteer; international development agent; FFA and 4H adviser; environmental education teacher; nature or environmental center educator	Agricultural Education
Technical communication	STC	Technical writer, scientific illustrator, educational video producer, document designer, manager of tele-communications, training and development specialist	Rhetoric
Turfgrass	EH	Golf course superintendent, grounds maintenance, athletic facilities manager, lawn service owner	Entomology; Horticultural Science; Plant Pathology; Soil, Water, and Climate
Veterinary medicine	ScAg	Veterinarian	Animal Science

Key to Majors

AgBu .... Agricultural and Food Business Management

AgEd .... Agricultural Education

AIM ..... Agricultural Industries and Marketing

ApEc ..... Applied Economics

APS ..... Animal Production Systems

BAE ..... Biosystems and Agricultural Engineering

CSPM ... Crop, Soil, and Pest Management

EH ..... Environmental Horticulture

ES ..... Environmental Science

FdSc ..... Food Science

Nutr ..... Nutrition

PreLA ... Pre-Landscape Architecture

ScAg ..... Science in Agriculture

STC ..... Scientific and Technical Communication

Degrees/Majors

Bachelor Degrees—The major curricula of COAFES lead to a bachelor of science.

Graduate Degrees—COAFES departments offer master of science and doctor of philosophy degrees through the Graduate School. For more information, see the *Graduate School Catalog*. COAFES also offers a master of agriculture degree, with an emphasis in horticultural science. Interested students should contact the Department of Horticultural Science or COAFES Student Services, 190 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108.

Majors

COAFES offers the following 12 interdisciplinary majors and areas of emphasis. Detailed information about each follows in the Degree Programs section. A matrix lists general interests and occupations with corresponding majors and primary COAFES departments on the previous page.

Agricultural and Food Business Management

- Business management
- Financial management
- Food processing, wholesaling, and retailing
- Marketing and sales management

Agricultural Education

- Agricultural science and technology education
- Agricultural leadership, training, and development
- Natural and managed environmental education

Agricultural Industries and Marketing

- Animal industries
- Crops/Soils industries
- Food industries
- Horticultural industries

Animal Production Systems

- Beef
- Dairy
- Equine
- Poultry
- Sheep
- Swine

Applied Economics

- Management and finance
- Marketing
- Food retailing
- Regional and public economics
- Resources and environment
- Trade and development

Crop, Soil, and Pest Management

Environmental Horticulture

- Greenhouse production and retail floriculture
- Turfgrass management
- Landscape design, implementation, and management
- Nursery production and garden center management

Environmental Science

- Environmental education:
  - General environmental education
  - Natural and managed environmental systems
- Environmental management:
  - Bioremediation
  - Environmental measurement
  - Waste management
- Land and water resources:
  - Hydrology—water resources
  - Land use management
  - Soil science
  - Sustainable agriculture
  - Water resource management

Food Science

Nutrition

- Coordinated program in dietetics
- Nutrition
- Nutrition science

Science in Agriculture

- Animal science
- Biotechnology
- Food science
- Nutrition
- Plant sciences
- Science in agriculture/doctor of veterinary medicine joint degree
- Soil science

Scientific and Technical Communication

Pre-professional Opportunities

Students may prepare in COAFES for the following upper division/professional programs.

- Pre-biosystems and agricultural engineering
- Pre-landscape architecture
- Pre-medicine and dentistry
- Pre-veterinary medicine

Double Majors

Students may find it advantageous to complete the requirements for a second major as part of their undergraduate program. In some cases this can be done by concentrating electives in the second area and thereby completing a second major without taking more than the minimum number of credits required for a bachelor's degree. In most cases, however, completing both majors requires that students take additional credits. For further information or an application, students should go to the COAFES Student Services Office. Students must file the application form before completing the required coursework for the second major.

Minors

To receive a minor, students must have an average GPA of 2.00 or higher, and a C- or better in the courses used in a program. To identify the appropriate electives, students should consult with an adviser.

Honors

The COAFES Honors Program provides a special educational opportunity for all COAFES students who qualify and accept the challenge of broadening, deepening, and enriching their education. The program gives students and faculty from diverse areas of interest and expertise the opportunity to interact with each other academically and socially. Honors students explore broad and varied aspects of agriculture through an honors colloquium course series (Agri 1000) and enhance their backgrounds through an honors experience course (Agri 3101). The honors experience course is student-designed and is supervised by COAFES faculty. Completion of the honors program, along with meeting the GPA requirement, leads to the *cum laude* degree designations in all COAFES majors.

For more information or an application, check with the COAFES Student Services Office.

Graduation Requirements

Bachelor's Degrees—Candidates are recommended for graduation after they

- complete the prescribed curriculum, including required courses and electives to meet the total number of credits required;
- earn a GPA of at least 2.00 in all coursework taken at the University;
- earn a GPA of at least 2.00 in coursework in the major and have a grade of at least C- in all courses labeled as professional courses in the major;
- earn a coefficient of completion of at least .75 in all coursework. See Academic Progress in the Policies section of this catalog.

Graduation application deadlines are set by the Office of the Registrar. The deadline is published in the *Class Schedule*. Students are responsible for knowing these deadlines. Extensions of deadlines are rarely granted. Students may turn in their application, with an APAS report or official program sheet signed by their adviser, to the One Stop Student Services Center, St. Paul, 130 Coffey Hall.

COAFES students are expected to maintain an academic standing that will enable them to meet minimum requirements for graduation. COAFES monitors academic progress each semester using the standards spelled out in the Policies section of this catalog.

Students who wish to use excess credits earned as an undergraduate for credit in the Graduate School should consult the *Graduate School Catalog* for current policies or the Graduate School Office, University of Minnesota, 316 Johnston Hall, 101 Pleasant Street S.E., Minneapolis, MN 55455.

Appeal System—Decisions by an adviser or a department's Scholastic Standing Committee or a subcommittee of a department's Scholastic Standing Committee may be appealed to the COAFES Scholastic Standing Committee, 190 Coffey Hall, whose decision in turn may be appealed to the COAFES dean.

Advising

The faculty of COAFES is committed to providing quality advising for students. To accomplish that goal, almost all advising is done by the regular faculty. All advisers have volunteered to advise undergraduates and have gone through training to familiarize themselves with the curriculum as well as with University policies and resources.

New students in COAFES are assigned an academic adviser. Advisers guide students through major curriculum requirements, help with course selection, provide references for scholarships and employment, supervise internships, provide advice and counsel, and listen to students' questions and concerns. Advisers also inform students about other resources at the University.

Most students prefer to have an adviser whose specialty matches their interests. If a student's interests or career goals change, the student may change advisers. For information or assistance in changing advisers, students should consult their major coordinator or the COAFES Student Services Office.

Advisers know the curriculum of students' majors and have a working knowledge of most of the required courses. Most advisers also know some of the basic requirements of other COAFES majors or programs and can help students consider other options if interests change.

Advisers help students with petitions when it is appropriate to request a variation from specific program requirements.

Advisers keep a record of students' work. Most advisers have advising files for the students assigned to them. They get regular academic progress reports and updated transcripts from the COAFES Student Services office.

Advisers often write letters of recommendation for scholarship, job, or graduate school applications.

Petition Procedures

To request permission to depart from usual procedures, students must complete a petition form available at the COAFES Student Services Office, 190 Coffey Hall, or at the One Stop Student Services Center in St. Paul, 130 Coffey Hall. All submitted petitions must be signed by an adviser. Some majors also require the signature of the major coordinator as well. Students present petitions to the COAFES Student Services Office for review by the Scholastic Standing Committee. A copy of the decision may be picked up about one week later.

Special Learning Opportunities and Resources

Undergraduate Research Opportunities Program (UROP)—The University of Minnesota's UROP offers financial awards to undergraduates for research, scholarly, or creative projects undertaken in partnership with a faculty member. Applications are accepted in the fall and early spring each year.

For more information or an application packet, students should contact the COAFES Student Services Office, 190 Coffey Hall (612-624-9299).

Professional Experience Program (PEP)—COAFES juniors and seniors may participate in PEP, a program designed for students who wish to reinforce their academic experience by working in an area related to their course of study. Students work full time either fall or spring semester or during the summer. Students earn 1-3 credits for satisfactory completion of a PEP program. Students may enroll in two different PEP programs, for a total of 6 credits. Salaries are paid by the cooperating businesses, industries, producers, and agencies participating in the program. For more information, students should consult their adviser or the COAFES Career Services Office, 190 Coffey Hall (612-624-2710).

Scholarships

COAFES has an extensive scholarship program for freshmen, transfer students, and continuing students. Scholarship brochures and applications are usually available in December. Students can pick them up in 190 Coffey Hall. Deadlines for applications are published in the applications and brochures.

International Programs

Two types of study abroad that can especially enhance degree work in COAFES are field study and integrated classroom study. Students may also seek internship credit from COAFES for academic projects arranged as a part of a MAST Experience Abroad (see below). For details, consult with Career Services.

Some scholarships are available through COAFES to help defray costs of overseas study-travel. A written report is required. Preference is given to proposals from non-English speaking countries. Students must initiate and plan the project with the aid of a faculty adviser. For more information, contact the COAFES Career Services Office, 190 Coffey Hall (612-624-2710).

MAST Experience Abroad—The MAST Experience Abroad program provides qualified individuals the opportunity to broaden their agricultural/horticultural skills and knowledge as well as develop or improve international language skills.

Practical training programs of 3 to 12 months are available to individuals between the ages of 18 and 30. Participants gain a cross-cultural experience by living and working with a host family in Australia, Austria, Brazil, Denmark, Finland, France, Germany, Italy, the Netherlands, New Zealand, Sweden, Switzerland, or the United Kingdom. Departure dates are in January, April, June, and September. For more information, students should contact the MAST International office, 240 Vocational and Technical Education Building (612-624-3740).

Other Study Abroad Opportunities—COAFES encourages study abroad for language acquisition or cultural learning. The resulting credits can often be used as electives. The University and other institutions sponsor a broad range of intensive language programs and area studies programs. For more information, see Study Abroad in the General Information section of this catalog.

Career Information

To help students secure employment after graduation, the Career Services Office, 190 Coffey Hall, announces job opportunities and helps arrange interviews with employers. The office manages the recruiting activity for both full-time and internship positions. Beginning their freshman year, students are encouraged to take advantage of the Career Services Office. A wide range of information is available at their Web site at <www.coafes.umn.edu/career>.

ºStudent Organizations

COAFES Student Board—The COAFES Student Board promotes student involvement in issues related to the quality and content of education both in and out of the classroom. The board creates channels of communication between the students, faculty, and administration of COAFES. Through the board, students participate in matters such as consideration of proposed curricula, questions related to instruction, improvement of educational facilities, development of administrative policy, and establishment of the goals of COAFES. COAFES students may file for election to the board or may serve as a representative of one of the clubs or organizations affiliated with the college. Further information related to the board and its operation may be obtained in 190 Coffey Hall.

Agricultural Ambassadors—Selected COAFES undergraduates volunteer their time to serve as goodwill ambassadors for the college. They foster communications among the college, prospective students, and the community at large. Each ambassador gains experience in public relations and recruitment and develops communications skills through public speaking engagements and small group discussions with prospective students. Agricultural ambassadors develop leadership and management skills by participating on the executive board and special committees. For more information, students should contact the COAFES Student Services Office, 190 Coffey Hall.

St. Paul Campus Board of Colleges—The St. Paul Campus Board of Colleges directs and coordinates student activities and encourages student leadership throughout the St. Paul campus. Its membership is drawn from the following colleges: COAFES, Biological Sciences, Natural Resources, Human Ecology, and Veterinary Medicine. The board brings questions from the student bodies to the administration of the colleges and discusses problems and reaches decisions on matters of general interest. The board cooperates with the Minnesota Student Association and the Assembly Committee on Student Affairs (ACSA). COAFES students may file for election to this board. For more information, inquire at the Office for Student Affairs, 130 Coffey Hall.

The Twin Cities Student Unions Board of Governors—The Twin Cities Student Unions Board of Governors is an advisory board for the St. Paul Student Center and Coffman Memorial Union.* Composed of students elected to represent various academic and student organizations on the Minneapolis and St. Paul campuses, the board formulates policies for operation of the student unions and establishes its budget. Information about the student unions, their operations, and opportunities to serve on various planning or programming committees, is available by calling 612-624-4738.

** Coffman Memorial Union is currently undergoing renovation and is expected to reopen winter 2003. For relocation information, call 612-624-4636, e-mail renovation@coffman.umn.edu, or visit the Web site at <www.coffman.umn.edu>.*

Student Representation on College and University Committees—All COAFES committees and most all-University committees have student representatives. For college committees, selection is made by the COAFES Student Board. All-University committees publish announcements in *The Minnesota Daily* and on bulletin boards around campus.

Other COAFES Student Organizations—Many of the undergraduate programs sponsor student clubs. For more information, students should check with their adviser or the COAFES Student Services Office, 190 Coffey Hall.

Other clubs affiliated with COAFES include:

- Agricultural Education Club
- Alpha Zeta Fraternity (an honor and service fraternity)
- Block and Bridle
- Gopher Dairy Club
- Gopher Crops and Soils
- Food Science Club
- Horticulture Club
- National AgriMarketing Association, Student Chapter (NAMA)
- Minnesota Collegiate Agri-Women
- Minnesota Economics Student Association (MESA)
- National Society for Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS)
- Environmental Studies Club
- Student Organization of Nutrition and Dietetics (SOND)
- American Society of Agricultural Engineers, Student Branch
- Rhetoric's Association of Student Technical Communicators (R.A.S.T.E.C.)
- Students in Honors
- Frenatar: Entomology Student Association
- Pre-Vet Med Club
- The Sheep and Goat Club
- Alpha Epsilon Delta (Pre-Med and Pre-Vet)
- American Association of Bovine and Swine

When asked about their plans as COAFES students, 67% hope to do undergraduate research, 56% plan on doing an internship, and 39% expect to study or travel abroad.

Directory

(*area code 612)*

Mailing address

190 Coffey Hall
1420 Eckles Avenue
St. Paul, MN 55108

COAFES services listed below are in 190 Coffey Hall unless otherwise noted.

COAFES Student Affairs

Admission to the College

General Information 624-3045

Career Services 624-2710
Includes:

- Career decision-making, and resources
- Career Day
- Internship opportunities
- Full-time employment opportunities
- Mentor Program

Honors Program (COAFES) 624-9299

International Study/Travel 624-2746

Student Services 624-7254
Includes:

- Advising
- Change of major
- Course cancellation and late withdrawal
- Graduation clearance
- Petitions

Undergraduate Research Program (UROP) 624-9299

COAFES Administrative Offices

Dean of the College and Vice President for Agricultural Policy
Charles C. Muscoplat, 277 Coffey Hall, 624-5387

Associate Dean for Academic Programs and Student Affairs
Ann Hill Duin, 190 Coffey Hall, 624-4212

Following is a list of COAFES departments. Several departments and units also have formal affiliations or administrative links to other colleges: Agriculture and Food Business Management has links with the Carlson School of Managment (CSOM); Agricultural Education has links with the College of Education and Human Development (CEHD); Biosystems and Agricultural Engineering has links with the Institute of Technology (IT); Food Science and Nutrition has links with the College of Human Ecology (CHE).

Each department offers courses, and most departments have ties with several of the undergraduate majors offered by COAFES.

Agricultural, Food, and Environmental Education

Roland Peterson, head
320 Vocational and Technical Education Building
1954 Buford Avenue
St. Paul, MN 55108
624-2221

Affiliated majors

- Agricultural Education

Agronomy and Plant Genetics

Burle B. Gengenbach, head
411 Borlaug Hall
1991 Upper Buford Circle
St. Paul, MN 55108
625-8761

Affiliated majors

- Agricultural Industries and Marketing
- Crops and Soils Resources Management
- Science in Agriculture

Animal Science

Abel Ponce de León, head
305 Haecker Hall
1364 Eckles Avenue
St. Paul, MN 55108
624-1205

Affiliated majors

- Agricultural Industries and Marketing
- Animal Production Systems
- Science in Agriculture

Applied Economics

Vernon Eidman, head
231 Classroom Office Building
1994 Buford Avenue
St. Paul, MN 55108
625-0231

Affiliated majors

- Agricultural Industries and Marketing
- Applied Economics
- Agricultural and Food Business Management

Biosystems and Agricultural Engineering

Kevin A. Janni, head
213 Agricultural Engineering
1420 Eckles Avenue
St. Paul, MN 55108
625-7733

Affiliated majors

- Biosystems and Agricultural Engineering (IT)
- Environmental Science
- Food Science

Entomology

Mark Ascerno, head
219 Hodson Hall
1980 Folwell Avenue
St. Paul, MN 55108
624-3278

Affiliated majors

- Agricultural Industries and Marketing
- Crops and Soils Resources Management
- Environmental Horticulture
- Science in Agriculture

Food Science and Nutrition

Joseph Warthesen, head
225 Food Science and Nutrition
1334 Eckles Avenue
St. Paul, MN 55108
624-3086

sahlers@che2.che.umn.edu
<www.fsci.umn.edu>

Affiliated majors

- Agricultural Industries and Marketing
- Food Science
- Nutrition

Horticultural Science

Karl Rosen, interim head
305 Alderman Hall
1970 Folwell Avenue
St. Paul, MN 55108
624-3606

Affiliated majors

- Agricultural Industries and Marketing
- Environmental Horticulture
- Science in Agriculture

Plant Pathology

Francis L. Pfleger, head
495 Borlaug Hall
1991 Upper Buford Circle
St. Paul, MN 55108
625-8200

Affiliated majors

- Agricultural Industries and Marketing
- Crops and Soils Resources Management
- Environmental Horticulture
- Science in Agriculture

Rhetoric

Dale L. Sullivan, head
202 Haecker Hall
1364 Eckles Avenue
St. Paul, MN 55108
624-7750

Affiliated majors

- Agricultural Industries and Marketing
- Scientific and Technical Communication

Soil, Water, and Climate

Edward A. Nater, interim head
439 Borlaug Hall
1991 Upper Buford Circle
St. Paul, MN 55108
625-9734
<www.soils.agri.umn.edu>

Affiliated majors

- Agricultural Industries and Marketing
- Crops and Soils Resources Management
- Environmental Horticulture
- Environmental Science
- Science in Agriculture

College of Agricultural, Food and Environmental Sciences

Degree Programs and Minors

Agricultural and Food Business Management

B.S.

The agricultural and food business management major is offered jointly by COAFES and the Carlson School of Management. The curriculum emphasizes using concepts and methods from economics and business management in the identifying, analyzing, and solving management problems related to food, agriculture, natural resources, and economic development. The program provides a balance between applied economics and business management studies, with a limited amount of applied science. Students may elect a variety of courses in their junior and senior years to accommodate special interests and career goals.

Graduates of the curriculum are prepared for a wide range of employment opportunities in the food system and other agribusinesses. Examples of employment areas include finance and banking, management, input, commodity and food marketing, sales, administration, public and industrial relations, production management, economic and statistical analysis, managerial accounting, management information systems, and transportation.

Students completing the program may also pursue graduate studies in preparation for research, teaching, or continuing education positions in academic institutions, government agencies, or industry.

Admission Requirements—Students are admitted to the major after satisfactory completion of a pre-agricultural and food business management program. Admission standards are developed in conjunction with the Carlson School of Management. Application deadlines are April 15 for fall semester and October 15 for spring semester.

To be considered for admission, students must meet the following pre-program requirements:

- Complete or have in progress coursework to total 60 credits by the time of admission.
- Complete the following management "tool" courses on an A-F grading basis before entering the program:
  —Acct 2050
  —ApEc 1101, 1102 or Econ 1101, 1102
  —OMS 1550
  —Math 1142 or Math 1271
- Earn a GPA of at least 2.80 in all coursework.
- Earn a GPA of at least 2.50 in the tool courses and at least a C- in each tool course.

COAFES students who plan to major in agricultural and food business management and have not completed the pre-agricultural and food business management program are assigned a faculty adviser, but retain pre-major status until they are accepted into the program.

Additional information about admission to the program and application materials can be obtained from the major coordinator for the agricultural and food business management program, 217 Classroom Office Building, from the Department of Applied Economics Web site at <www.apec.umn.edu>, or from the COAFES Student Services Office, 190 Coffey Hall.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 64 credits in the major. Frequently, courses in the foundation requirements also apply toward completion of the liberal education requirements. All required courses must be taken A-F, and a grade of at least C- is required in all professional courses and area of emphasis courses.

Required Courses

Foundation Requirements (at least 24 cr)

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1152—Writing on Issues of Science and Technology (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3257—Scientific and Technical Presentations (3 cr)
Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4 cr)

Note: Students contemplating graduate work are encouraged to take both Math 1271 and 1272.

Complete 4 credits of physical and 4 credits of biological sciences from courses listed below:

Agro 1101—Biology of Plant Food Systems (4 cr)
Biol 1001—Introductory Biology I (4 cr)
Biol 1009—General Biology (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
Chem 1021—Chemical Principles I (4 cr)
FScN 1021—Introductory Microbiology (4 cr)
Geo 1001—The Dynamic Earth (4 cr)
Geog 1403W—Biogeography of the Global Garden (4 cr)
Geog 1425-1426—The Atmosphere (4 cr)
Hort 1001—Plant Propagation (4 cr)
IofT 1101—Environmental Issues and Solutions (4 cr)
Phys 1001W—Energy and the Environment (4 cr)
Soil 1125—The Soil Resource (4 cr)

Ethics and Responsible Management of Agriculture, Food, and Environmental Systems

Student must take one course (3 cr) from the list below that fosters one or more of the following objectives:

- Responsible judgment about the management of natural resources and the environment;
- Responsible judgment regarding ethical and policy issues related to agriculture;
- Application of global perspectives to agriculture, food, and environmental issues and decisions;
- Application of a historical perspective to the role of science and technology.

This course must be taken A-F and passed with grade of C- or better.

Agro 1103, 3203W, AnSc 1011, Biol 1051, 4501, EEB 3001, EE 1701W, ES 1011, FScN 1102, Geo 3005, Geog 3401W, HSci 3211, 3331, NRES 3011W, 3061W, PBio 1212W, PlPa 1001, or ScAg 1501

Professional Requirements

Applied Economics

ApEc 1001—Orientation (1 cr)
ApEc 1101—Principles of Microeconomics (3 cr)
ApEc 1102—Principles of Macroeconomics (3 cr)

Students are encouraged to pursue at least one internship during their undergraduate study. Often these internships are salaried and count for academic credit toward a degree.

ApEc 3001—Applied Microeconomics: Consumers, Producers, and Markets (4 cr)
ApEc 3002—Applied Microeconomics: Managerial Economics (4 cr)
ApEc 3006—Applied Macroeconomics: Government and the Economy (3 cr)
ApEc 3007—Applied Macroeconomics: Policy, Trade, and Development (3 cr)
ApEc 3501—Agribusiness Finance (3 cr)
ApEc 4821—Agribusiness Management (5 cr)

Carlson School of Management

Acct 2050—Introduction to Financial Reporting (4 cr)
Acct 3001—Introduction to Management Accounting (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Mktg 3001—Principles of Marketing (3 cr)
OMS 1550—Business Statistics: Data Sources, Presentation, and Analysis (4 cr)

Areas of Emphasis (12 cr)

All Emphases

Students must take a minimum of two courses (6-8 cr) in ApEc or Econ and a minimum of two courses (6-8 cr) in CSOM or DHA (3245, 4121, or 4343 only). These requirements may be met by selecting courses in one of the following areas of emphasis.

Business Management

Acct 3201—Intermediate Management Accounting (2 cr)
Acct 5100—Corporate Financial Reporting (4 cr)
ApEc 3451—Food and Agricultural Sales (3 cr)
ApEc 4096—Professional Experience Program: Internship (1-3 cr)
ApEc 4481—Futures and Options Markets (3 cr)
ApEc 5711—U.S. Agricultural and Environmental Policy (3 cr)
BLaw 3058—The Law of Contracts and Agency (4 cr)
Fina 4241—Corporate Financing Decisions (4 cr)
Fina 4242—Corporate Investment Decisions (4 cr)
HRIR 3021—Human Resource Management and Industrial Relations (3 cr)
HRIR 3032—Training and Development (2 cr)
HRIR 3042—The Individual and Organizational Performance (2 cr)
Mgmt 4002—Managerial Psychology (4 cr)
Mgmt 4008—Entrepreneurial Management (4 cr)

Financial Management

Acct 5101—Asset Valuation and Income Determination (4 cr)
Acct 5125—Auditing Principles and Procedures (4 cr)
Acct 5160—Financial Statement Analysis (4 cr)
ApEc 4096—Professional Experience Program: Internship (1-3 cr)
ApEc 4481—Futures and Options Markets (3 cr)
ApEc 5751—Agricultural Trade and Trade Policy: Issues and Analysis (3 cr)
BLaw 3058—The Law of Contracts and Agency (4 cr)
Econ 3701 or 4721H—Money and Banking (3 cr)
Econ 4432W—International Finance (3 cr)
Econ 4751—Financial Economics (3 cr)
Fina 4121—Financial Markets and Interest Rates (2 cr)
Fina 4122—Banking Institutions (2 cr)
Fina 4241—Corporate Financing Decisions (4 cr)
Fina 4242—Corporate Investment Decisions (4 cr)
Fina 4321—Portfolio Management and Performance Evaluation (4 cr)
Fina 4322—Security Analysis (4 cr)
Fina 4641—International Finance and Risk Management (4 cr)
Ins 5100—Corporate Risk Management (2 cr)

Marketing, Sales, and Food Industry Management

ApEc 3411—Grain Marketing Economics (3 cr)
ApEc 3421—Livestock and Meat Marketing Economics (3 cr)
ApEc 3451—Food and Agricultural Sales (3 cr)
ApEc 3821—Retail Center Management (3 cr)
ApEc 4096—Professional Experience Program: Internship (1-3 cr)
ApEc 4103—World Food Problems (3 cr)
ApEc 4451W—Food Marketing Economics (3 cr)
ApEc 4481—Futures and Options Markets (3 cr)
ApEc 5711—U.S. Agricultural and Environmental Policy (3 cr)
ApEc 5751—Agricultural Trade and Trade Policy: Issues and Analysis (3 cr)
DHA 3245—Nonstore Retailing (3 cr)
DHA 4241—Retail Promotion (3 cr)
DHA 4242—Retail Buying (3 cr)
Mgmt 5004—Negotiations (2 cr)
Mktg 3010—Marketing Research (4 cr)
Mktg 4020—Advanced Logistics and Supply Chain (2 cr)
Mktg 4030—Selling and Sales Management (4 cr)
Mktg 4040—Buyer Behavior (4 cr)
Mktg 4050—Integrated Marketing Communications (4 cr)
Mktg 4060—Marketing and Distribution Channels (4 cr)
Mktg 4070—International Marketing (4 cr)
Mktg 4080—Marketing Strategy (4 cr)
OMS 3056—Production and Inventory Management (4 cr)

Individualized Area of Emphasis

Students preparing for career opportunities that emphasize skills such as accounting, communications, law, or information systems may use this alternative to design an area of emphasis. A program of study under the emphasis must be approved by the adviser and the major coordinator. At least 6 of the 12 credits must be completed after receiving approval.

Internships

Internships are recommended for all students in the major. Internship credits do count toward the degree requirements.

Agricultural Education

Department of Work, Community, and Family Education

B.S.

The undergraduate agricultural education program is a collaborative partnership between COAFES and the College of Education and Human Development. Three specializations are available; the following two prepare students for Minnesota state teaching licensure:

- agricultural science and technology education
- natural and managed environmental education

The agricultural leadership, training, and development specialization prepares students for agricultural industry and leadership careers, but does not lead to teaching licensure.

Agricultural Science and Technology Education Specialization

This specialization serves students preparing to teach agriscience, agribusiness, agriculture, horticulture, food systems, agrimechanics, and natural resource management under the licensure field of agricultural education in public schools at the 5-12 level. The specialization's broad agricultural science and technology background also prepares graduates for a wide range of agriculturally related positions in sales, management, finance, and production aspects of agriculture.

Admission Requirements—Students may be admitted to this program as freshmen or may transfer into the program any semester. They must have a GPA of 2.50 for admission and complete the Praxis I: Pre-Professional Skills Tests (PPST).

Degree Requirements

Students may graduate from this program with a minimum 2.00 GPA, but a minimum 2.50 GPA is required for recommendation for a Minnesota teaching license.

Students must complete at least 128 credits to graduate, including required courses in the major. Students also must complete the University's liberal education requirements, including approved writing intensive (W) courses. For more information, see page 31 in this catalog.

The specialization requires a broad study of agriculture, including plant science (horticulture, agronomy, plant pathology, and entomology), animal science, natural resources, soils, economics and agribusiness, agricultural mechanization, food science, foundations of education, foundations of agricultural education, and a full-year student teaching experience.

Required Courses

Communications (11 cr)

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Physical and Biological Sciences (19-20 cr)

BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Biol 1009—General Biology (4 cr)
or Biol 1051—Introduction to Environmental Science (3 cr)
or Agro 1101—Biology of Plant Food Systems (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
MicB 2022—General Microbiology (2 cr)
Phys 1001W—Energy and the Environment (4 cr)
or Phys 1101W—Introductory College Physics I (4 cr)
ScAg 1501—Biotechnology, People, and the Environment (3 cr)

Mathematics (3 cr)

Math 1031—College Algebra and Probability (3 cr)

Social Science (8 cr)

HSci 1814—Introduction to History of Science: Ancient Science to the Scientific Revolution (4 cr)
or HSci 1815—Introduction to History of Science: Modern Science (4 cr)
Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr)

Agricultural Sciences and Applied Economics (40 cr)

Plant Science (6 cr)

Agri 3001—Pests and Crop Protection (3 cr)

Plus 3-4 credits from the following:

Agro 1103—Crops, Environment, and Society (4 cr)
Agro/Hort 4401—Plant Genetics and Breeding (4 cr)
Hort 1001—Plant Propagation (4 cr)
Hort 1002—Home Horticulture (3 cr)
Hort 1012—Woody Landscape Plants (3 cr)
Hort 1013—Floral Design (2 cr)
Hort 3002—Greenhouse Management (3 cr)

Animal Science (6 cr)

AnSc 1403—Companion Animal Nutrition and Care (2 cr)
or AnSc 2401—Animal Nutrition (3 cr)

Plus 3-4 credits from the following:

AnSc 1101—Introductory Animal Science (4 cr)
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 2301—Systemic Physiology (4 cr)
AnSc/Agro 3203W—Environment, Global Food Production, and the Citizen (3 cr)
AnSc 3221—Animal Breeding (4 cr)

Natural Resources (6 cr)

At least 6 credits from the following:

Agro/AnSc 3203W—Environment, Global Food Production, and the Citizen (3 cr)
EEB 3001—Ecology and Society (3 cr)
ES 1011—Issues in the Environment (3 cr)
ES 1051—Introduction to Environmental Science (3 cr)
FW 1002—Wildlife: Ecology, Values, and Human Impact (3 cr)
NRES 1201—Conservation of Natural Resources (3 cr)

Soils (4 cr)

Soil 1125—The Soil Resource (4 cr)
or Soil 2125—Basic Soil Science (4 cr)

Applied Economics and Agribusiness (8-9 cr)

ApEc 1101—Principles of Microeconomics (3 cr)
ApEc 3451—Food and Agricultural Sales (3 cr)

Plus 2-3 credits from the following:

ApEc 1251—Principles of Accounting (3 cr)
ApEc 3401—Markets, Marketing, and Prices (2 cr)
ApEc 3811—Principles of Farm Management (3 cr)
ApEc 3821—Retail Center Management (3 cr)

Agricultural Mechanization (6 cr)

Select two of the following courses:

AFEE 2051—Current Technical Competencies (3 cr)
AFEE/BIE 3112—Technical Drawing and Production Technologies (3 cr)
AFEE/BIE 3121—Communication, Energy and Power, Transportation and Machinery Technologies (3 cr)

Food Science (3 cr)

FScN 1102—Food: Safety, Risks, and Technology (3 cr)

Professional Education (38 cr)

Foundations (15 cr)

EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)
EdHD 5003—Developmental and Individual Differences in Educational Contexts (3 cr)
EdHD 5005—School and Society (2 cr)
EdHD 5007—Technology for Teaching and Learning (1.5 cr)
EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)
EdPA 5341—The American Middle School (3 cr)
PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)
or PubH 5003—Fundamentals of Alcohol and Drug Abuse (1 cr)

Agricultural Education (15 cr)

AFEE 1001—Introduction to Agricultural Education and Extension (1 cr)
AFEE 1002—Principles of Career Planning for Agricultural Professionals (1 cr)
AFEE 2096—Professional Practicum in Agricultural Education: Early Experience (1 cr)
AFEE 5111—Agricultural Education: Methods of Teaching (4 cr)
AFEE 5112—Agricultural Education Program Organization and Curriculum for Youth (3 cr)
AFEE 5114—Agricultural Education Teaching Seminar (1 cr)
AFEE 5116—Coordination of SAE Programs: Work-based Learning (2 cr)
AFEE 5118—Strategies for Managing and Advising the FFA Organization (2 cr)

Work, Community, and Family Education (8 cr)

WCFE 5697—Teaching Internships: School and Classroom Settings (2 cr)
WCFE 5698—Teaching Internship (6 cr)
Completion of standard first aid and cardiopulmonary resuscitation (CPR) training is required for licensure.

Natural and Managed Environmental Education Specialization

This specialization serves students preparing to teach agriscience, agribusiness, agriculture, horticulture, food systems, agrimechanics, and natural resource management, all under the licensure field of agricultural education in public schools at the 5-12 level. In addition, graduates have an emphasis in natural resource management and education and are prepared for work in environmental learning centers.

Admission Requirements—Students may be admitted to this program as freshmen or may transfer into the program any semester with a minimum overall GPA of 2.50 and complete the Praxis I: Pre-Professional Skills Tests (PPST).

Degree Requirements

Students may graduate from this program with a minimum 2.00 GPA, but a minimum 2.50 GPA is required for recommendation for a Minnesota teaching license.

Students must complete at least 128 credits, including required courses in the major. Students also must complete the University's liberal education requirements, including approved writing intensive (W) courses. For more information, see page 31 in this catalog.

Minnesota consistently ranks among the top 10 states nationally in total agricultural cash receipts and in agricultural exports.

The specialization requires a broad study in agriculture focused on the natural and managed environmental education areas. Areas of study include the environment, land, water, climate, economics, soil, plant science, animal science, and agricultural mechanization. It also includes foundations in education, foundations in agricultural education, and a full-year student teaching experience.

Required Courses

Communications (11 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Mathematics (3 cr)
Math 1031—College Algebra and Probability (3 cr)

Physical and Biological Science (19-20 cr)
BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Biol 1009—General Biology (4 cr)
or Biol 1051—Introduction to Environmental Science (3 cr)
or Agro 1101—Biology of Plant Food Systems (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
MicB 2022—General Microbiology (2 cr)
Phys 1001W—Energy and the Environment (4 cr)
or Phys 1101W—Introductory College Physics I (4 cr)
ScAg 1501—Biotechnology, People, and the Environment (3 cr)

Social Science (8 cr)
HSci 1814—Introduction to History of Science: Ancient Science to the Scientific Revolution (4 cr)
or 1815—Introduction to History of Science: Modern Science (4 cr)
Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr)

Natural and Managed Environmental Science (40 cr)
Environmental (9 cr)
ES 1011—Issues in Environment (3 cr)
Plus at least 6 credits from the following:
EEB 3001—Ecology and Society (3 cr)
ES 1051—Introduction to Environmental Science (3 cr)
FR 2104—Forest Measurement Techniques (1 cr)
FR 3104—Forest Ecology (4 cr)
FR 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
FW 1002—Wildlife: Ecology, Values, and Human Impact (3 cr)
FW 3003—Wildlife in Agricultural Land (2 cr)

Land, Water, Atmosphere (7 cr)
Soil 2125—Basic Soil Science (4 cr)
Plus 3-4 credits from the following:
NRES 1201—Conservation of Natural Resources (3 cr)
Soil 1425—The Atmosphere (3 cr)
Soil 3221—Soil Conservation and Land-Use Management (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)

Applied Economics and Agribusiness (3 cr)
ApEc 1101—Principles of Microeconomics (3 cr)
or ApEc 3451—Food and Agricultural Sales (3 cr)

Plant Science (6 cr)
Agri 3001—Pests and Crop Protection (3 cr)
Plus 3-4 credits from the following:
Agro/Hort 4401—Plant Genetics and Breeding (4 cr)
Agro or Hort (Electives)

Animal Science (6 cr)
AnSc 2401—Animal Nutrition (3 cr)
Plus 3-4 credits from the following
AnSc 1101—Introductory Animal Science (4 cr)
AnSc 1403—Companion Animal Nutrition and Care (2 cr)
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 3203W—Environment, Global Food Production, and the Citizen (3 cr)

Agricultural Mechanization (6 cr)
Select 6 credits from the following:
AFEE 2051—Current Technical Competencies (3 cr)
AFEE/BIE 3112—Technical Drawing and Production Technologies (3 cr)
AFEE/BIE 3121—Communication, Energy and Power, Transportation and Machinery Technologies (3 cr)

Food Science (3 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)

Professional Education (38 cr)
Foundations (15 cr)
EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)
EdHD 5003—Developmental and Individual Differences in Educational Contexts (3 cr)
EdHD 5005—School and Society (2 cr)
EdHD 5007—Technology for Teaching and Learning (1.5 cr)
EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)
EdPA 5341—The American Middle School (3 cr)
PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)
or PubH 5003—Fundamentals of Alcohol and Drug Abuse (1.5 cr)

Agricultural Education (15 cr)
AFEE 1001—Introduction to Agricultural Education and Extension (1 cr)
AFEE 1002—Principles of Career Planning for Agricultural Professionals (1 cr)
AFEE 2096—Professional Practicum in Agricultural Education: Early Experience (1 cr)
AFEE 5111—Agricultural Education: Methods of Teaching (4 cr)
AFEE 5112—Agricultural Education Program Organization and Curriculum for Youth (3 cr)
AFEE 5114—Agricultural Education Teaching Seminar (1 cr)
AFEE 5116—Coordination of SAE Programs: Work-based Learning (2 cr)
AFEE 5118—Strategies for Managing and Advising the FFA Organization (2 cr)

Work, Community, and Family Education (8 cr)
WCFE 5697—Teaching Internship: School and Classroom Settings (2 cr)
WCFE 5698—Teaching Internship (6 cr)
Completion of standard first aid and cardiopulmonary resuscitation (CPR) training is required for licensure.

Agricultural Leadership, Training, and Development Specialization

This specialization provides a unique, futuristic educational opportunity combining agricultural science, communication, leadership, education, business and industry, training, and development. It provides a general background in agriculture, with agribusiness and industry associations. This specialization does not lead to teaching licensure.

The agricultural industry is faced with leadership and employee training and development challenges. This specialization provides students with opportunities and flexibility in employment ranging from human resource development, sales and marketing, extension, and communications in statewide, national, and international situations.

Admission Requirements—Students may be admitted to this program as freshmen or may transfer into the program any semester. They must have a GPA of 2.00 for admission.

Degree Requirements

Students must complete at least 128 credits, including required courses in the major. Students also must complete the University's liberal education requirements, including approved writing intensive (W) courses. For more information, see page 31 in this catalog.

This specialization requires business experience as well as completion of courses. Students must maintain an overall GPA of 2.00.

Required Courses

Communications (11 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Mathematics (3 cr)
Math 1031—College Algebra and Probability (3 cr)

Physical and Biological Sciences (14 cr)
Agro 1101—Biology of Plant Food Systems (4 cr)
or Biol 1009—General Biology (4 cr)
BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Chem 1011—General Principles of Chemistry (4 cr)
ScAg 1501—Biotechnology: People and the Environment (3 cr)

Social Science (4 cr)
Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr)

Agricultural Sciences and Economics (52 cr)
Plant Science (9 cr)
Agri 3001—Pests and Crop Protection (3 cr)
Plus at least 6 credits from the following:
Agro 1103—Crops, Environment, and Society (4 cr)
Agro 2501—Weed Biology and Systematics (2 cr)
Agro 3005—Applied Crop Physiology and Development (2 cr)
AnSc 3203W—Environment, Global Food Production, and the Citizen (3 cr)
Hort 1001—Plant Propagation (4 cr)
Hort 1002—Home Horticulture (3 cr)
Hort 3005—Environmental Effects on Horticultural Crops (2 cr)

Animal Science (10 cr)
AnSc 1101—Introductory Animal Science (4 cr)
AnSc 1403—Companion Animal Nutrition and Care (2 cr)
or AnSc 2401—Animal Nutrition (3 cr)
Plus 3-4 credits from the following:
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 3203W—Environment, Global Food Production, and the Citizen (3 cr)

Soils (7 cr)
Soil 1125—The Soil Resource (4 cr)
or Soil 2125—Basic Soil Science (4 cr)
Plus 3 credits from the following:
Soil 1425—The Atmosphere (3 cr)
Soil 3221—Soil Conservation and Land-Use Management (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)

Applied Economics and Agribusiness (12 cr)
ApEc 1101—Principles of Microeconomics (3 cr)
ApEc 1251—Principles of Accounting (3 cr)
ApEc 3451—Food and Agricultural Sales (3 cr)
Plus 2-3 credits from the following:
ApEc 3401—Markets, Marketing and Prices (2 cr)
ApEc 3811—Principles of Farm Management (3 cr)
ApEc 3821—Retail Center Management (3 cr)

Agricultural Mechanization (3 cr)
AFEE 2051—Current Technical Competencies (3 cr)

Agricultural Leadership and Development (6 cr)
AFEE 4221—Rural Leadership Development (3 cr)
AFEE 5361—World Development Problems (3 cr)

Experiential Education (3 cr)
AFEE 3096—Experiential Learning: Production and Business (1–3 cr)

Agricultural Education and Extension (9 cr)
AFEE 1001—Introduction to Agricultural Education and Extension (1 cr)
AFEE 1002—Principles of Career Planning for Agricultural Professionals (1 cr)
AFEE 5111—Agricultural Education: Methods of Teaching (4 cr)
AFEE 5331—History, Philosophy, and Systems of Extension (3 cr)

Human Resource Development/Adult Education (15 cr)
HRD 5001W—Survey: Human Resource Development and Adult Education (3 cr)
HRD 5105—Strategic Planning in Human Resource Development (3 cr)
HRD 5201—Personnel Training and Development (3 cr)
HRD 5301—Organization Development (3 cr)
Plus (three) elective credits in HRD courses.

Emphasis Areas

Students must select 10 credits in one of the following three emphasis areas:

Agricultural Science (10 cr)
Agro 2103—Grain Grading and Crop Utilization (1 cr)
Agro 2105—Seed Technology (1 cr)
Agro 2501—Weed Biology and Systematics (2 cr)
Agro 3203W—Environment, Global Food Production, and the Citizen (3 cr)
Agro 3005—Applied Crop Physiology and Development (2 cr)
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 2211—Biometrics for Livestock (3 cr)
AnSc 2301—Systemic Physiology (4 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)
PlPa 2002—Diseases of Field Crops (3 cr)
PlPa 3002—Air Pollution, People, and Plants: The Science and the Ethics (3 cr)

Agricultural Business and Management (10 cr)
ApEc 3041—Economic Development of U.S. Agriculture (3 cr)
ApEc 3401—Markets, Marketing, and Prices (2 cr)
ApEc 3411—Grain Marketing Economics (2 cr)
ApEc 3421—Livestock and Meat Marketing Economics (2 cr)
ApEc 3811—Principles of Farm Management (3 cr)

Communication (10 cr)
Rhet 1152W—Writing on Issues of Science and Technology (4 cr)
Rhet 3221W—Theories of Human Communication (4 cr)
Rhet 3257—Scientific and Technical Presentations (3 cr)
Rhet 3266—Group Process, Team Building, Leadership (3 cr)
Rhet 3401—Accessing Information Through Electronic Media (3 cr)

Agricultural Industries and Marketing

B.S.

Industries related to modern agriculture include manufacturers and distributors of farm production inputs (such as equipment, structures, animal feed, health products, seeds, fertilizers, and crop protection products); assemblers, processors, manufacturers, and distributors of products originating from farms (products such as meat, milk, eggs, wool, grains, fruits, vegetables, nursery crops, flowers, and turf); and finance and insurance industries providing agricultural credit. Agribusinesses such as these regularly search for individuals who have a broad

education in the scientific (and technical) aspects of agriculture, effective work and communication skills, and quantitative and qualitative skills to solve business problems.

All departments in COAFES contribute to and are represented by the agricultural industries and marketing (AIM) major. The major provides a broad-based educational program reflecting the academic strengths of COAFES and the University at large. It also prepares students for a challenging career in agricultural industries.

The scientific knowledge and technical skills necessary to become an effective agribusiness professional are provided through requirements in the basic and agricultural sciences and are strengthened by selection of one of five areas of emphasis: animal industries, horticultural industries, crops and soils industries, food industries, or individualized emphasis.

Degree Requirements

Students must complete at least 120 credits to graduate, including 108 credits in the major. Besides completing the University's liberal education requirements, all majors must complete 1) a common core of foundation courses in the areas of quantitative studies (mathematics, accounting, and statistics) and science (biology and chemistry) and 2) professional courses with three major clusters (communications, business, and agriculture). Students must complete at least 14 credits in their area of emphasis. Finally, students must complete an internship or a student project. All required courses must be taken A-F, and a grade of at least C- is required in all professional courses and area of emphasis courses.

Required Courses

Foundation Requirements

Quantitative Foundations

ApEc 1251—Principles of Accounting (3 cr)
Math 1031—College Algebra (3 cr)
or Math 1142—Short Calculus (4 cr)

Plus one of the following:

Agro 4101—Agricultural Decision-Making and Experimentation (3 cr)
AnSc 2211—Biometrics for Livestock (3 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)

Science Foundations

Agro 1101—Biology of Plant Food Systems (4 cr)
or Biol 1009—General Biology (4 cr)
BioC 1001—Elementary Biochemistry (3 cr)
or BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Chem 1011—General Principles of Chemistry (4 cr)

Professional Requirements

A grade of at least C- is required in all professional courses and the area of emphasis.

Communications

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1152—Writing on Issues in Science and Technology (4 cr)
or Rhet 3257—Scientific and Technical Presentations (3 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3266—Group Process, Team Building, and Leadership (3 cr)
Rhet 3562—Technical and Professional Writing (4 cr)
Rhet 4165—Managerial and Organizational Communication, Planning, and Change (3 cr)
or Rhet 5258—Information-Gathering Techniques in Scientific and Technical Communication (3 cr)

Business

ApEc 1101—Principles of Microeconomics (3 cr)
ApEc 1102—Principles of Macroeconomics (3 cr)

Three of the following:

ApEc 3001—Applied Microeconomics: Consumers, Producers and Markets (4 cr)
ApEc 3002—Applied Microeconomics: Managerial Economics (4 cr)
ApEc 3411—Grain Marketing Economics (3 cr)
ApEc 3421—Livestock and Meat Marketing Economics (3 cr)
ApEc 3811—Principles of Farm Management (3 cr)
ApEc 3821—Retail Center Management (3 cr)
ApEc 4451—Food Marketing Economics (3 cr)
ApEc 4821—Agribusiness Management (5 cr)

One of the following:

ApEc 3451—Food and Agricultural Sales (3 cr)
ApEc 3501—Agribusiness Finance (3 cr)
BIE 3061—Professional Sales Management (3 cr)
Jour 3201—Principles of Advertising (3 cr)

Agriculture

AFEE 1002—Principles of Career Planning for Agricultural Professionals (1 cr)
AgET 3213—Engineering Principles and Applications (3 cr)
or FScN 1102—Food: Safety, Risks, and Technology (3 cr) (required for food industry emphasis)
Agro 1103—Crops, Environment, and Society (4 cr)
or Hort 1001—Plant Propagation (4 cr)
AnSc 1011—Domestic Animals and Society (3 cr)
or AnSc 1101—Introductory Animal Science (4 cr) (required for animal industries emphasis)
Soil 2125—Basic Soil Science (4 cr)
or FScN 1112—Principles of Nutrition (3 cr)
Xxxx 4096—Professional Experience Program: Internship (3 cr)
or AIM 4011—Student Project/Field Investigation (3 cr)

Areas of Emphasis

Animal Industries

AnSc 1101—Introductory Animal Science (4 cr)

Plus three of the following:

AnSc 2301—Systemic Physiology (4 cr)
AnSc 2401—Animal Nutrition (3 cr)
AnSc 3221—Animal Breeding (4 cr)
AnSc 3511—Animal Growth and Development (3 cr)

Crops and Soils Industries*

Agri 3001—Pests and Crop Protection (3 cr)
Agro 4005—Applied Crop Physiology and Development (4 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)

At least 4 credits from the following:

Agro 2104, 2501, 3203, 4401, 4505, 4603, 4605, Ent 3005, PlPa 2002, Soil 3221, 3612, 4111, 4511

**The emphasis in crops and soils industries is also offered at Southwest State University in Marshall, Minnesota, through a joint agreement. Students can contact Southwest State University or COAFES for more information.*

Horticultural Industries

Hort 1001—Plant Propagation (4 cr) (cannot be used for agriculture requirement above)
Hort 3002—Greenhouse Management (3 cr)

At least 7 credits from the following:

Hort 4021, 4041, 4051, 4061, 4071, 4072, 4401, 5021, 5023, 5031, 5032, 5041, 5051, 5052, 5061, 5071, 5183

Food Industries

ApEc 4451—Food Marketing Economics (3 cr) (cannot be used for business requirement)
FScN 1021—Introductory Microbiology (4 cr)

Plus at least 6 credits from the following:

FScN 1511—Food Animal Products for Consumers (3 cr)
FScN 3102—Introduction to Food Science (3 cr)
FScN 3615—Sociocultural Aspects of Food, Nutrition, and Health (3 cr)
FScN 4614—Community Nutrition (3 cr)

Individualized Emphasis

At least 14 cr selected in consultation with an adviser and with approval of the AIM major committee. The courses comprising the individualized emphasis must have a definite theme. A collection of unrelated courses is unacceptable.

Final Project

Professional Experience Program (Xxxx 4096) or AIM 4011 required.

Agronomy

Minor Only

This minor provides strong science based courses emphasizing crop management in the context of sustainable ecosystems. It is well suited for students majoring in agriculture, food and environmental education; animal science; business and economics; environmental science, or for students seeking knowledge and principles of crop production. The minor allows students to complete course work providing the minimal background needed to prepare for the Certified Crop Advisor (CCA) exams. Students must complete a minimum of 17 credits.

Required Courses

Agro 4660—Senior Capstone (2 cr)
Agri 3001—Pests and Crop Protection (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)

Electives

9 credits of Agro 2xxx or higher courses selected from the following list in consultation with the minor adviser:

Agro 2104—Grain and Seed Technology (2 cr)
Agro 2501—Plant Identification in Urban and Rural Landscapes (2 cr)
Agro 4005—Applied Crop Physiology and Development (4 cr)
Agro 4401—Plant Genetics and Breeding (4 cr)
Agro 4505—Integrated Weed Management (3 cr)
Agro 4603—Field Crop Scouting and Problem Diagnosis (2 cr)
Agro 4605—Management Strategies for Crop Production (4 cr)

Animal Production Systems

B.S.

The animal production systems major prepares students for work as managers and technical advisers for animal production systems and sales, for various careers in animal industries, or for graduate study in animal related specializations. The curriculum emphasizes applied principles and includes courses in agriculture, science, mathematics, business, and social science. Areas of emphasis include dairy, beef, equine swine, sheep, and poultry. An individualized emphasis may also be pursued.

Degree Requirements

Students must complete at least 120 credits to graduate, including 55 credits in the major. Frequently, courses in the foundation requirements also apply toward liberal education requirements. All required courses must be taken A-F, and a grade of at least C- is required in all professional courses and area of emphasis courses.

Required Courses

Foundation Requirements

ApEc 1101—Principles of Microeconomics (3 cr)
BioC 1012—General Principles of Biochemistry (3 cr)
Biol 1009—General Biology (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
Math 1031—College Algebra and Probability (3 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562—Technical and Professional Writing (4 cr)

Professional Requirements

AFEE 1002—Principles of Career Planning in Agriculture (1 cr)
Agro 1103—Crops, Environment, and Society (4 cr)
AnSc 1101—Introductory Animal Science (4 cr)
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2211—Biometrics for Livestock (3 cr)
AnSc 2301—Systemic Physiology (4 cr)
AnSc 2401—Animal Nutrition (3 cr)
AnSc 3221—Animal Breeding (4 cr)
AnSc 4609—Livestock Systems Analysis (2 cr)
AnSc 4096—Professional Experience Program: Internship (3 cr)
VPB 3103—General Microbiology (4 cr)
or CVM 3502—Animal Health and Disease (3 cr)

Choose at least 15 credits from the following (courses from this list cannot be applied to an area of emphasis):

AgEt 3213 (3 cr), AnSc 1011 (3 cr), AnSc 3203 (3 cr), AnSc 3305 (4 cr), AnSc 3511 (3 cr), AnSc 4501 (3 cr), AnSc 4601 (4 cr), AnSc 4602 (4 cr), AnSc 4603 (4 cr), AnSc 4604 (4 cr), AnSc 4605 (4 cr), AnSc 4611 (2 cr), AnSc 4613 (2 cr), AnSc 4614 (2 cr), ApEc 1251 (3 cr), ApEc 3421 (2 cr), ApEc 3451 (3 cr), ApEc 3811 (3 cr), Ent 4281 (3 cr), Soil 2125 (4 cr)

Areas of Emphasis

Beef

AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 4403—Ruminant Nutrition (3 cr)
AnSc 4603—Beef Production Systems Management (4 cr)
AnSc 4613—Advanced Beef Production Systems Management (2 cr)

Dairy

AnSc 4011—Dairy Cattle Breeding (3 cr)
AnSc 4403—Ruminant Nutrition (3 cr)
AnSc 4604—Dairy Production Systems Management (4 cr)
AnSc 4614—Advanced Dairy Production Systems Management (2 cr)

Equine

AnSc 2012—Horse Production (ITV from Crookston) (3 cr)
AnSc 3102—Equine Management (ITV from Crookston) (3 cr)
In consultation with their adviser, students must complete at least 3 additional credits of selected equine lab courses offered during summer sessions at Crookston and 4 additional credits of other selected equine courses.

Sheep

AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 4403—Ruminant Nutrition (3 cr)
AnSc 4602—Sheep Production Systems Management (4 cr)

Swine

AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 4401—Swine Nutrition (3 cr)
AnSc 4601—Pork Production Systems Management (4 cr)
AnSc 4611—Advanced Pork Production Systems Management (2 cr)

Poultry

AnSc 4602—Poultry Production Systems Management (4 cr)
At least 3 poultry courses from the Midwest Poultry Consortium Summer Program at Madison, WI.

Individualized Emphasis (12 cr min)

Courses may be selected according to the student's interest in consultation with an adviser and with the approval of the Animal Production Systems Committee.

Animal Science

Minor Only

The minor is for students who want to include animal science coursework to enhance or supplement their major program. Students have flexibility in choosing courses to meet the requirements. To complete the minor, students must complete at least 20 credits with an AnSc designator.

Required Courses

At least 10 credits must be 3xxx or higher.

University of Minnesota barley varieties occupy 95% of Minnesota acres and have contributed approximately $13 million to the state.

Applied Economics

B.S.

The applied economics major prepares students for careers in private industry, government agencies, agribusiness, or graduate work. Students may choose one of six areas of emphasis: management and finance; marketing; food retailing; trade and development; resources and environment; or regional and public economics. Students may also, in consultation with their adviser, develop an individualized area of emphasis. The curriculum emphasizes fundamental written and oral communication skills and a strong foundation in economic principles and their applications. Areas of employment for graduates include management, finance, marketing and international trade, domestic and international development, environmental impact assessment, resource management and use, and government-related work in planning, taxation, and development. Entry-level jobs are often in merchandising and sales, credit analysis, management, and other customer contact areas.

Degree Requirements

Students must complete at least 120 credits to graduate, including 52 credits in the major. Besides completing the University's liberal education requirements, students must complete a core of foundational requirements (writing performance and speaking performance) and professional requirements, including basic economic principles, applied micro/macroeconomic theory, accounting, and statistics. Every students' program is capped off with 12 credits of advanced-level coursework, called an area of emphasis, tailored to meet the student's particular interests and career interests. All required courses must be taken A-F, and a grade of at least C- is required in all professional courses and area of emphasis courses.

Required Courses

Foundation Requirements

Math 1142—Short Calculus

or Math 1271—Calculus (4 cr)

Note: Students contemplating graduate study are encouraged to take Math 1271 and 1272.

Writing Performance Courses

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)

Rhet 1152—Writing on Issues of Science and Technology (3 cr)

Rhet 3562—Technical and Professional Writing (4 cr)

Speech Performance Courses

Rhet 1223—Oral Presentations in Professional Settings (3 cr)

Rhet 3257—Scientific and Technical Presentations (3 cr)

Rhet 3266—Group Process, Team Building, and Leadership (3 cr)

Social Science

Students in ApEc must complete 3 credits in social sciences beyond the 6 credits required for liberal education.

Ethics and Responsible Management of Agriculture, Food, and Environmental Systems

Students must take one course (3 cr) from the list below that fosters one or more of the following objectives:

- Responsible judgements about the management of natural resources and the environment;
- Responsible judgements regarding ethical and policy issues related to agriculture;
- Application of global perspectives to agriculture, food, and environmental issues and decisions;
- Application of a historical perspective to the role of science and technology.

This course must be taken A-F and passed with grade of C- or better.

Agro 1103, 3203W, AnSc 1011, Biol 1051, 4501, EE 1701W, EEB 3001, ES 1011, FScN 1102, Geo 3005, Geog 3401W, HSci 3211, 3331, NRES 3011W, 3061W, PBio 1212W, PlPa 1001, ScAg 1501

Professional Requirements

ApEc 1001—Orientation to Applied Economics (1 cr)

ApEc 1101—Principles of Microeconomics (3 cr)

ApEc 1102—Principles of Macroeconomics (3 cr)

ApEc 1251—Principles of Accounting (3 cr)

or Acct 2050—Introduction to Financial Reporting (4 cr)

ApEc 3001—Applied Microeconomics: Consumers and Markets (4 cr)

ApEc 3002—Applied Microeconomics: Managerial Economics (4 cr)

ApEc 3006—Applied Macroeconomics: Government and the Economy (3 cr)

ApEc 3007—Applied Macroeconomics: Policy, Trade, and Development (3 cr)

Stat 3011—Introduction to Statistical Analysis (4 cr)

or OMS 1550—Business Statistics (4 cr)

Areas of Emphasis

At least two upper division ApEc courses (excluding 3991, 4096, 5891, 5991) must be chosen, plus two additional courses from ApEc, Econ, Carlson School of Management, or other courses listed below, for a total of 12 credits (minimum). While students are encouraged to complete credits in one of the following areas, students may select courses across the categories in consultation with their adviser.

Management and Finance

Acct 3001, 5100, 5160, ApEc 3501, 3811, 3921, 4096, 4481, 4821W, Econ 3701 or 4721, 4751, Fina 4241, 4242, HRIR 3021, Mgmt 3001

Marketing

ApEc 3411, 3421, 3451, 3821, 4096, 4451W, DHA 4241, Mktg 3001, 3010, 4030, 4040, 4050, 4060, 4080

Food Retailing

ApEc 3421, 3451, 3821, 4096, 4451W, 4481, DHA 4241, 4242, HRIR 3032, 3042, Mktg 4020, 4040, 4060, 4080, OMS 3001, 3056

Trade and Development

ApEc 3041W, 3071, 4096, 4103, 5711, 5751, BGS 3002, Econ 4041, 4301W or 4331W, 4307 or 4337, 4311, 4313, 4315, 4421W, 4432W

Resources and Environment

ApEc 4096, 4611, 5651, 5711, Econ 3611, 4619W, 4831W, Geog 3331, NRES 3202W, 3241W, 3261W, 4211, UrbS 3751

Regional and Public Economics

ApEc 4096, 4311, 5321, BGS 3002, Econ 3041, Econ 3501 or 4531, 3601 or 4631, 3801, 4307 or 4337, 4623, 4831W, PubH 3801, UrbS 3001

Individualized Area of Emphasis

To develop such a program, consult with adviser.

Internships

Internships are recommended for all students in the major.

Applied Economics Minor

For students who want to include a basic core of applied economics coursework to enhance or supplement their major program. Students have flexibility in choosing courses to meet the minor requirements. To complete the minor, students must complete at least 16 credits.

Required Courses

ApEc 1101—Principles of Microeconomics (3 cr)

ApEc 1102—Principles of Macroeconomics (3 cr)

ApEc electives—3xxx or higher (10 cr)

Climatology

Minor Only

The minor lets students broaden their expertise in weather and climate studies. Students who will be working for any industry or agency that depends on understanding weather and climate change will find the minor useful. Students take courses in meteorology, atmosphere, and biometeorology. Electives are in climate models, climate variations, climate change, and atmospheric boundary layer.

To complete the minor, students must complete at least 20 credits.

Required Courses

Soil 1425—The Atmosphere (3 cr)

Soil 1426—The Atmosphere Laboratory (1 cr)

Soil 5211—Environmental Biophysics and Ecology (3 cr)

Electives (13 credits)

EEB 5008—Forest Response to Quaternary Climate Change (2 cr)

EEB 5009—Quaternary Vegetation History and Climate (2 cr)

Geog 3401—Geography of Environmental Systems (3 cr)
Geog 5423—Climate Models and Modeling (3 cr)
Geog 5426—Climatic Variations (3 cr)
Soil 5402—The Atmospheric Boundary Layer (3 cr)

Crop, Soil, and Pest Management

B.S.

The crop, soil, and pest management major is for persons who are interested in becoming proficient in the principles and practices necessary for economically viable and environmentally sound management of the natural resource base upon which the food and fiber production system depends. Students follow a strong science-based curriculum that emphasizes crop, soil, and pest management in the context of global ecosystems.

The major prepares students for careers in the production and management of field and vegetable crops and for positions as technical representatives for seed, agricultural chemical, and crop protection companies; crop advisers/consultants; extension educators; state and federal regulatory professionals; farm managers; soil and water specialists/conservationists; research technicians; and research support staff. Quality performance in the major prepares students to pursue crop, soil, and environmental science related graduate degrees. The major provides the subject matter background needed for certified crop adviser (CCA) and certified professional agronomist (CPAg) programs. By selecting the soil science area of emphasis, students meet the minimum requirements for employment by NRCS as a soil conservationist and the initial requirements to become a certified professional soil scientist (CPSSc).

Admission Requirements—Admitted to COAFES.
Note: This major is also offered at Southwest State University in Marshall, Minnesota, through a joint agreement. Students can contact Southwest State University or COAFES for more information (612-625-6754).

Degree Requirements

Students must complete at least 120 credits to graduate, including 58 credits in the major. Typically 14 credits in the foundation and major requirements also apply toward completion of liberal education requirements. All required courses must be taken A-F, and a grade of at least C- is required in all professional and area of emphasis courses.

Required Courses

Foundation Requirements

Communications

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentation in Professional Settings (3 cr)
Rhet 3562—Technical and Professional Writing (4 cr)

Quantitative Foundations

Agro 4101—Experimental Design/Plot Techniques (3 cr)
or Stat 3011—Introduction to Statistical Analysis (4 cr)
Math 1031—College Algebra and Probability (3 cr)
or Math 1142—Short Calculus (3 cr)

Physical and Biological Sciences

Agro/Hort 4401—Plant Genetics and Breeding (4 cr)
or GCD 3022—Genetics (3 cr)
BioC 1001—Elementary Biochemistry (3 cr)
or BioC 2011 Biochemistry for the Agricultural and Health Sciences (3 cr)
Biol 1009—General Biology (4 cr)
or Agro 1101—Biology of Plant Food Systems (3 cr)
Chem 1011—General Principles of Chemistry (4 cr)
EEB 3001—Ecology and Society (3 cr)

Professional Requirements (58-61 cr)

General Core (11-13 cr)

AFEE 1002—Principles of Career Planning for Agricultural Professions (1 cr)
AgET 3213—Engineering Principles and Applications (3 cr)
or AgET 5212—Safety and Health Issues in Agricultural Work Environment (2 cr)
or AnSc 1101—Introduction to Animal Science (4 cr)
or FScN 1102—Food: Safety, Risk, and Technology (3 cr)
Agro 4660—Senior Capstone: Leadership, Decision Making and Problem Solving (2 cr)
ApEc 1101—Principles of Microeconomics (3 cr)
Xxxx 4096—Professional Experience Program: Internship (3 cr)

Crop Management Core (13-14 cr)

Agro 1103—Crops, Environment, and Society (4 cr)
or Hort 1101—Plant Propagation (4 cr)
Agro 2501—Plant Identification in Urban and Rural Landscapes (2 cr)
Agro 4005—Applied Crop Physiology and Development (4 cr)
or Biol 3002—Plant Biology: Function (2 cr)
and Hort 3005—Environmental Effects on Horticultural Crops (2 cr)
or Biol 3005—Plant Function Laboratory (2 cr)
Agro 4605—Crop Management Strategies (4 cr)
or Hort 5032—Sustainable Commercial Vegetable Production Systems (3 cr)

Soil Management Core (10 cr)

Soil 2125—Basic Soil Science (4 cr)
Soil 3221—Soil Conservation and Land-use (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)

Pest Management core (12 cr)

Agro 4505—Integrated Weed Management (3 cr)
Agro 4603—Field Crop Scouting and Problem Diagnosis (3 cr)
Ent 3005—Insect Biology (3 cr)
or Ent 4015—Ornamental and Turf Entomology (3 cr)
PlPa 2002—Diseases of Field Crops (3 cr)
or PlPa 2001—Introductory Plant Pathology for Horticulturists (3 cr)

Area of Emphasis (12 cr min)

Students **must designate** an area of emphasis within the major before completion of 60 credits of their program or upon admission to the program with advanced standing.

An area of emphasis consists of a group of courses (12 credits minimum) selected in consultation with the student's adviser and approved by the major coordinator. One option for fulfilling the area of emphasis is to complete part or all of one of the **18 official minors** in COAFES (see page 7 for listing). The second option is to design an individualized area of emphasis around a clearly evident theme or focus that serves the student's professional interests. Such themes might include crop science, precision agriculture, biotechnology or environmental studies. Students should consult with their advisers in constructing an individualized area of emphasis. This emphasis may include only one 1xxx course.

Entomology

Minor Only

Entomology is a scientific discipline that is rooted in biology. It involves the study of insects and other arthropods and their biology, ecology, and control in relation to their environment and to human beings. With the continuing need for and interest in insect pest management, there is likely to be a demand for students trained in entomology and allied sciences to monitor pest insect populations, supervise the application of control measures, and participate in other environmental impact assessments. Students completing the program have a solid base of coursework for application to graduate programs.

To complete the minor, students must complete at least 15 credits.

Required Courses (5 cr min)

Ent 3005—Insect Biology (3 cr)

Select one of the following:

Ent 4015—Ornamental and Turf Entomology (2 cr)
Ent 4251—Forest and Shade Tree Entomology (3 cr)
Ent 4281—Veterinary Entomology (2 cr)
Ent 5021—Insect Taxonomy (4 cr)

Electives (10 cr min)

Choose additional 3xxx-5xxx courses in entomology. Special problems, special lecture, or workshop courses cannot be included in this area.

Environmental Horticulture

B.S.

The environmental horticulture program educates and trains students in all phases of horticulture: crop production; education (botanic gardens and arboreta); service oriented activities (landscaping); plant production; use and function (design, reclamation, and restoration); and recreation (golf courses and parks). Students gain experience in how plants can be used to alter environments, restore damaged landscapes, improve the health and well-being of individuals, educate the public about science and agriculture, bring together and improve community environments, and provide recreational and practical benefits to the public.

The program offers the following areas of emphasis: landscape design, implementation, and management; nursery production and garden center management; greenhouse production and retail floriculture; and turfgrass management. An individualized program of study can be arranged. The program offers a wide range of internship opportunities and requires all students engage in a professional experience.

Degree Requirements

Students must complete at least 120 credits to graduate, including 49 credits in the major. The program requires courses in algebra, chemistry, physics, and biology. Applied courses are in horticultural science, soil science, entomology, plant pathology, and applied economics. Courses vary depending on emphasis. All required courses must be taken A-F, and a grade of at least C- is required in all professional courses and area of emphasis courses.

Required Courses

Foundation Requirements

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
One other communications course (3 cr)
ApEc 1101—Microeconomics (3 cr)
BioC 2011—Biochemistry for Agricultural and Health Sciences (3 cr)
Biol 1009—General Biology (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
or Chem 1021—Principles of Chemistry I (4 cr)
and Chem 1022—Principles of Chemistry II (4 cr)
Math 1031—College Algebra and Probability (3 cr)
or Math 1142—Short Calculus (3 cr)
Phys 1001—The Physical World: Energy and Its Impact on the Environment (4 cr)

Professional Requirements

Ent 4251—Forest and Shade Tree Entomology (3 cr)
or Ent 3005—Insect Biology (3 cr)
or Ent 4015—Ornamental and Turf Entomology
GC 1513—Principles of Small Business Management (3 cr)
Hort 1001—Plant Propagation (4 cr)
Hort 1011—Herbaceous Landscape Plants (4 cr)
Hort 1012—Woody Landscape Plants (4 cr)
Hort 3002—Greenhouse Management (3 cr)
Hort 3005—Environmental Effects on Horticultural Crops (2 cr)
and Biol 3002—Plant Biology: Function (2 cr)
Hort 4096—Professional Experience Program (3 cr)
Hort 4401—Plant Genetics and Breeding (4 cr)
PlPa 2001—Introductory Plant Pathology for Horticulturists (3 cr)
PlPa 4000—Plant Pathology Practicum (1 cr)
Soil 2125—Basic Soil Science (4 cr)

Areas of Emphasis

Landscape Design, Implementation, and Management (18 cr min)

Hort 4021—Landscape Design, Implementation, and Management I (4 cr)
Hort 4061—Turf and Landscape Management (4 cr)
Hort 5021—Landscape Design II (4 cr)
At least two additional horticultural science courses (6 cr)

Nursery Production and Garden Center Management (18 cr min)

ApEc 3821—Retail Center Management (3 cr)
Hort 4041—Nursery Production and Management I (4 cr)
Hort 5041—Nursery Production and Management II (3 cr)
At least two additional horticultural science courses (8 cr)

Greenhouse Production and Retail Floriculture (18 cr min)

ApEc 3821—Retail Center Management (3 cr)
Hort 4051—Potted Plant Production I (4 cr)
Hort 5051—Bedding Plant and Specialty Annual Perennial Crop Production (4 cr)
Hort 5052—Cut Flower Production (3)
At least one additional horticultural science course (4 cr)

Turfgrass Management (18 cr min)

Hort 4021—Landscape Design, Implementation, and Management I (4 cr)
Hort 4061—Turf and Landscape Management (4 cr)
Hort 5061—Turfgrass Science (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)
At least one additional horticultural science course (3-4 cr)

Individualized Program of Study (18 cr min)

Seven courses (21-23 cr) chosen in consultation with an adviser. Students must submit a course of study to the Department of Horticultural Science Undergraduate Affairs Committee at least three semesters before graduation.

Final Project

All students are required to do an internship. After arranging an internship and getting approval from an adviser, students register for Hort 4096.

Environmental Science

B.S.

This major is for students interested in an interdisciplinary science education that prepares them to deal with environmental problems. The basic natural resources of land, air, and water are studied in the context of protecting and sustaining the environment. Students become knowledgeable about environmental issues and the science behind policy decisions.

Students must complete coursework in math and science, economics, humanities, communication, and applied technical aspects of environmental problems. The environmental science core draws courses from atmospheric science, soil science, hydrology, and plant science.

Areas of emphasis include land and water resources (land use management, soil resources, sustainable agriculture, water resources); environmental management (bioremediation, environmental measurement, waste management); and environmental education (natural and managed environmental systems).

Degree Requirements

Students must complete at least 120 credits to graduate, including 60 credits in the major. The major requires courses in calculus, chemistry, physics, biology, and geology. Applied science courses are in meteorology, soil science, hydrology, and plant science. Area of emphasis courses vary by emphasis. All required courses must be taken A-F, and a grade of at least C- is required in all professional courses and area of emphasis courses.

Required Courses

Foundation Requirements

Agro 4101—Experimental Design/Plot Techniques (3 cr)
or Stat 3011—Introduction to Statistical Analysis (4 cr)
ApEc 1101—Principles of Microeconomics (3 cr)
BioC 2011—Biochemistry for Agriculture and Health Sciences (3 cr)
or Chem 2301—Organic Chemistry I (3 cr)
Biol 1009—General Biology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
Phys 1101—Fundamental Physics I (4 cr)
and Phys 1102—Fundamental Physics II (4 cr)
or Phys 1201—General Physics (5 cr)
and Phys 1202—General Physics (5 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562—Technical and Professional Writing (4 cr)

Professional Requirements

ApEc 4611—Resource Development and Environmental Economics (3 cr)
or NRES 3261W—Economics and Natural Resource Management (3 cr)
ES 1011—Issues in the Environment (3 cr)
or Agro 3203—Environment, Global Food Production, and the Citizen (3 cr)
ES 1051—Introduction to Environmental Science (3 cr)
ES 4096—Experience and Training in a Field Setting (1-4 cr)
FR 4114—Hydrology (3 cr)
or Soil 4216—Containment Hydrology (2 cr)
Geo 1001—Introduction to Geology (4 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
PlPa 3002—Air Pollution, People, and Plants (3 cr)
or Soil 1425—The Atmosphere (3 cr)
Soil 2125—Basic Soil Science (4 cr)
Soil 3221—Soil Conservation and Water Quality Impacts (2 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)
Soil 3612—Soil and Environmental Biology (3 cr)
Soil 4021—Environmental Impact Assessment (3 cr)
Soil 4601—Soils and Pollution (3 cr)

Choose one from the following:

Agro 1103—Crops, Environment, and Society (3 cr)
Agro 2501—Plant Identification for Rural and Urban Landscapes (2 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)

Areas of Emphasis (12 cr)

Land and Water Resources

Land Use Management Recommended Courses

FR 4131—GIS for Natural Resource Analysis (3 cr)
or Geog 3561—Principles of Geographic Information Science (4 cr)
Soil 5511—Field Study of Soils (2 cr)
Soil 5555—Wetland Soils (3 cr)

Select additional courses from the following:

FR 4262—Remote Sensing of Natural Resources (3 cr)
Geo 4701—Geomorphology (3 cr)
Geo 4703—Glacial Geology (4 cr)
Geo 5108—Principles of Environmental Geology (3 cr)
Geog 3355W—Environmental Quality (3 cr)
Geog 3361W—Land Use, Landscapes, and the Law (3 cr)
Geog 3401W—Geography of Environmental Systems (3 cr)
Hort 5071—Landscape and Reclamation Ecology (3 cr)
PA 5013—Law and Urban Land Use (3 cr)

Soil Science Required Courses

Students must complete required courses for a soil science license.
Soil 4511—Field Study of Soils (2 cr)
Soil 4216—Containment Hydrology (2 cr)
or Soil 5232—Vadose Zone Hydrology (3 cr)
Soil 5515—Soil Genesis and Landscape Relations (3 cr)

Select 5 credits from the following:

Geo 4703—Glacial Geology (4 cr)
Soil 3521—Soil Judging (1 cr)
Soil 4121—Microbial Ecology and Applied Microbiology (3 cr)
Soil 5211—Environmental Biophysics and Ecology (3 cr)
Soil 5555—Wetland Soils (3 cr)

Sustainable Agriculture Recommended Courses

Agro 1103—Crops, Environment, and Society (4 cr)
Agro 4888—Issues in Sustainable Agriculture (2 cr)
PlPa 2002—Management and Control of Field Crop Diseases (3 cr)

Select additional courses from the following:

Agro 3203—Environment, Global Food Production, and the Citizen (3 cr)
Agro 4103—World Food Problems (3 cr)
Agro 4505—Integrated Weed Management (4 cr)
Ent 3001—Insects and Insect Management (1 cr)
Ent 5321—Ecology of Agriculture Systems (3 cr)
Ent 5341—Biological Control of Insects and Weeds (3 cr)
FR 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
NRES 3101—Conservation of Biodiversity (3 cr)

Water Resources

Hydrology Recommended Courses

Students completing the hydrology emphasis may be eligible for state and federal certification as hydrologists.
FR 4114—Forest Hydrology and Watershed Management (3 cr)
CE 3502—Fluid Mechanics (3 cr)
CE 4512—Open Channel Hydraulics (3 cr)
or GeoE 4351—Ground Water Mechanics (3 cr)
EEB 4601—Limnology (3 cr)

Some courses for COAFES degree programs can be taken during summer or May session. To find them, see the *Class Schedule* or go to <http://onestop.umn.edu/schedule/html/tc.html>.

FR 5153—Forest and Wetland Hydrology (3 cr)
Soil 5555—Wetland Soils (3 cr)
Geo 5701—General Hydrogeology (3 cr)
Math—1271/1272 Calculus I and II (4/4 cr)
Math 2243—Linear Algebra and Differential Equations (3 cr)
WRS 5001—Field Methods in Water Resources (3 cr)

Water Resource Management Recommended Courses

Soil 5555—Wetland Soils (3 cr)
EEB 4601—Limnology (3 cr)
Ent 5361—Aquatic Insects (3 cr)
FR 4114—Forest and Wetland Hydrology (3 cr)
FR 4461—Water Quality: The International Dimension (3 cr)
FR 5153—Forest and Wetland Hydrology (3 cr)
Geo 5108—Principles of Environmental Geology (3 cr)
Geo 5701—General Hydrogeology (3 cr)
Hort 5071—Landscape and Reclamation Ecology (3 cr)
WRS 5001—Field Methods in Water Resources (3 cr)
WRS 5101—Water Resources: Individuals and Institutions (3 cr)

Environmental Management

Bioremediation Recommended Courses

CE 4562—Remediation Technology (3 cr)
Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Soil 4121—Microbial Ecology and Applied Microbiology (3 cr)
Soil 5601—Principles of Waste Management (3 cr)
PubH 5111—Preventing Pollution (3 cr)
PubH 5180—Environmental Microbiology (4 cr)

Environmental Measurement Recommended Courses

PlPa 3002—Air Pollution, People and Plants (3 cr)
PubH 5103—Exposure to Environmental Hazards (2 cr)
PubH 5112—Risk Analysis: Application to Risk-Based Decision Making (3 cr)
PubH 5171—Properties, Behavior and Measurement of Environmental Airborne Contaminants (4 cr)
PubH 5180—Environmental Microbiology (4 cr)
PubH 5190—Environmental Chemistry (3 cr)
PubH 5200—Environmental Health (2 cr)
Soil 5211—Environmental Biophysics and Ecology (3 cr)

Waste Management Required Courses

CE 4561—Solid Hazardous Waste (3 cr)
CE 4562—Remediation Technology (3 cr)

PubH 5103—Exposure to Environmental Hazards (2 cr)
PubH 5111—Preventing Pollution (3 cr)
PubH 5112—Risk Analysis: Application to Risk-Based Decision Making (3 cr)
PubH 5176—Hazardous Materials and Waste Management (3 cr)
PubH 5180—Environmental Microbiology (4 cr)
PubH 5190—Environmental Chemistry (3 cr)
PubH 5200—Environmental Health (2 cr)
Soil 4121—Microbial Ecology and Applied Microbiology (3 cr)
Soil 5601—Principles of Waste Management (3 cr)

Environmental Education (Natural and Managed Environmental Systems)

Professional Education

Students electing to teach K-12 should select this grouping of courses to become certified. Students should meet early in their program with an adviser from the Agricultural, Food, and Environmental Education Division. Program requirements are detailed on page 43.

General Environmental Education Recommended Courses

CI 5502—Special Topics: Outdoor Science Education (1-8 cr)
CI 5747—Global and Environmental Education: Content and Practice (3 cr)
EEB 3361—Visions of Nature: The Natural World and Political Thought (3 cr)
FR 5403—Fundamentals of Natural Resource Education (3 cr)
Hort 5071—Restoration and Reclamation Ecology (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
or NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
NRES 4811—Natural Resources Interpretation (3 cr)
NRES 3205—Field Ecology in NRES (4 cr)
NRES 4101—Conservation of Biodiversity (3 cr)
Rec 5301—Wilderness and Adventure Education (3 cr)
Rec 5311—Programming Outdoor and Environmental Education (3 cr)
Rhet 3383—In Search of Nature (3 cr)
Soil 5601—Principles of Waste Management (3 cr)

Final Project

Internship requirement—students must complete ES 4096.

Food Science

B.S.

Food science is the application of science to the study of food. Chemistry, microbiology, physics, and engineering are scientific disciplines involved in food science.

- Chemistry—because foods undergo chemical reactions when they are heated, frozen, mixed with each other, and stored.
- Microbiology—because many foods are made by microorganisms (e.g., bread, cheese, yogurt, sauerkraut, tempeh) and because microorganisms cause extensive, rapid, and often dangerous spoilage.
- Physics and engineering—because foods must be constructed, moved through the factory, made safe, and distributed intact to the consumer.

Food science involves creating new food products and making current products more stable, nutritious, convenient, reliable, and safe. Food science begins with an understanding of the plants and animals that will become food, and ends with an understanding of why people choose to eat the foods they eat.

The food science program is a collaborative partnership between COAFES and the College of Human Ecology.

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements, and maintain an overall GPA of at least 2.00. All required courses must be taken A-F, and FScN courses must be completed with a grade of at least C-.

Required Courses

Foundation Courses

BioC 3021—Biochemistry (3 cr)
or BioC 4331—Biochemistry I (4 cr)
and BioC 4332—Biochemistry II (4 cr)
Biol 1009—General Biology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Math 1271—Calculus I (4 cr)
Math 1272—Calculus II (4 cr)
MicB 3301—Biology of Microorganisms (5 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
Select one of the following physics series: Phys 1101/1102, Phys 1201/1202, Phys 1301/1302. ***Note:*** Phys 1301 and 1302 are recommended.
Select one of the following courses: BioC 4025, Chem 2111, Chem 2311, FScN 4613

Professional Courses

FScN 1102—Food: Safety, Risks, and Technology (3 cr)
FScN 1112—Principles of Nutrition (3 cr)
FScN 3102—Introduction to Food Science (3 cr)
FScN 4111—Food Chemistry (3 cr)
FScN 4121—Food Microbiology and Fermentations (3 cr)
FScN 4122—Laboratory Methods in Microbiology and Fermentations (2 cr)
FScN 4131—Food Quality (3 cr)
FScN 4312—Food Analysis (4 cr)
FScN 4331—Food Process Engineering I (3 cr)
FScN 4332—Food Process Engineering II (4 cr)
One of the following FScN courses with a capstone component: FScN 4341, 4342, 4343, 4344, 4345, 4346

Food Science Minor

Complete at least 20 FScN credits from the following list: FScN 1102, 3102, 4111, 4121, 4122, 4131, 4312, 4331, 4332

Food Systems and the Environment

Minor Only

This is a interdisciplinary minor based in COAFES. This minor serves students from other colleges who have an interest in and a desire to acquire some breadth about food systems and the environment. Students completing this minor will be better prepared to:

- Understand the complexity of modern global food systems.
- Understand the interdependence of rural and urban societies.
- Understand the environmental impact of consumer driven food systems choices.
- Manage natural resources used for food and fiber for the benefit of society.
- Make more responsible personal and public decisions impacting food systems and the environment.

This minor is limited to non-COAFES majors. Interested students should contact the minor adviser (612-625-6754) or the COAFES Student Services Office (612-625-7254).

In consultation with the minor adviser, students must complete five courses (15 credits minimum) from the following list. Students may only choose one course from each designator.

AgEt 5203—Environmental Impacts of Food Production (3 cr)
Agri 3001—Pests and Crop Protection (3 cr)
Agri 3500—Global Seminar (3 cr)
Agro 1103—Crops, Environment, and Society (4 cr)
Agro /AnSc 3203W—Environment, Global Food Production and the Citizen (3 cr)
Agro 4103/ApEc 4103/FScN 4103—World Food Problems (3 cr)
AnSc 1011—Domestic Animals and Society (3 cr)
AnSc 1101—Introductory Animal Science (4 cr)
ApEc 3041W—Economic Development of U.S. Agriculture (3 cr)
ApEc 4611—Resource Development and Environmental Economics (3 cr)
Ent 4015—Ornamentals and Turf Entomology (3 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)
FScN 1112—Principles of Nutrition (3 cr)
PlPa 1001—Microbes, Plants, and People: The Social and Economic Impact of Plant Disease (3 cr)
Rhet 1315—The Land in American Experience (3 cr)
Rhet 3383—In Search of Nature (3 cr)
ScAg 1501—Biotechnology, People, and the Environment (3 cr)
Soil 1125—The Soil Resource (4 cr)
Soil 3221—Soil Conservation and Land Use (3 cr)

Horticultural Science

Minor Only

The horticultural science minor requires completion of 18 credits. At least 10 credits of horticultural science, including one elective course, and at least two Hort courses at 4xxx or 5xxx. A maximum of 3 credits of Hort 5090—Directed Studies may be applied to the minor.

Students wishing to complete a minor in horticultural science should contact the Department of Horticultural Science, 305 Alderman Hall for assistance.

Minor Requirements

Biol 3002—Plant Biology: Function (2 cr)
Hort 1001—Plant Propagation (4 cr)
Hort 3005—Environmental Effects on Horticultural Crops (2 cr)

Integrated Pest Management in Cropping Systems

Minor Only

Students selecting this interdisciplinary minor learn how the environment and cropping systems interact with the biology of the major agronomic or horticultural crop pests. Students also learn to select and apply efficient, environmentally sound pest management procedures. Courses come from agronomy and plant genetics; entomology; horticultural science; plant pathology; and soil, water, and climate.

The minor provides sufficient knowledge and skills for employment in agricultural crop protection, product development and sales, crop management consultation, pest regulation, research, or application of agricultural crop protection materials. To complete the minor, students must complete at least 20 credits.

Required Courses

Agro 2501—Plant Identification for Urban and Rural Landscapes (2 cr)
Agro 4505—Biology, Ecology, and Management of Invasive Plants (4 cr)
Ent 5211—Insect Pest Management (3 cr)
PlPa 5204—Epidemiology and Plant Disease Resistance (4 cr)

Choose one of the following management courses:
Agro 4605—Management Strategies for Crop Production (3 cr)
Hort 4041—Nursery Production and Management I (3 cr)
Hort 4051—Floriculture Production and Management I (3 cr)
Hort 4061—Turf and Landscape Management (4 cr)
Hort 5031—Sustainable Fruit and Vegetable Production (4 cr)
Soil 3222—Soil Conservation and Land Use Management (3 cr)

Choose one of the following applied courses:
Agro 4603—Field Crop Scouting and Problem Diagnosis (3 cr)
Agro 4888—Issues in Sustainable Agriculture (2 cr)
PlPa 5202—Field Plant Pathology (2 cr)
Soil 3612—Soil and Environmental Biology (3 cr)

International Agriculture

Minor Only

For COAFES students who want to add an international dimension to their degree, or for non-COAFES students who want to acquire experience and knowledge in international agriculture. Students have flexibility in planning the minor. To complete the minor, students must complete at least 20 credits. Contact COAFES Student Services for more information.

Required Courses

Agri 3000—International Seminar (1 cr)
4xxx internship, independent study project, or extensive review of literature (4 cr, must be a COAFES course)
3xxx-5xxx electives in language or culture (6-8 cr)
Electives in agricultural science (9-12 cr)

Nutrition

B.S.

The nutrition program is a collaborative partnership between COAFES and the College of Human Ecology. The major explores how nutrients and the foods from which they are derived aid the body in health, growth, and development. With major national and international concern for how food and nutrition affect health and disease, registered dietitians and nutritionists have many career opportunities. Students choose one of three options: nutrition, the Coordinated Program in Dietetics, or nutrition science.

Students expecting to apply to either the Coordinated Program in Dietetics, an internship, or a graduate school should maintain a GPA of at least 2.80. A cumulative GPA of at least 3.00 is highly recommended, and in the case of some graduate schools is required, for admission.

The Didactic Program in Dietetics (nutrition option) is currently granted approval status, and the Coordinated Program in Dietetics is currently granted accreditation status, by the Commission on Accreditation/Approval for Dietetics Education of the American Dietetic Association, 216 W. Jackson Blvd., Chicago, IL 60606-6995 (312-899-4876).

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements, and must maintain an overall GPA of at least 2.00. All required courses must be taken A-F, and FScN courses must be completed with a grade of at least C-.

Required Courses for All Options

BioC 3021—Biochemistry (3 cr)
Biol 1009—General Biology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2301—Organic Chemistry I (3 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)
FScN 1112—Principles of Nutrition (3 cr)
FScN 3102—Introduction to Food Science (3 cr)
FScN 3612—Life Cycle Nutrition (3 cr)
FScN 4612—Human Nutrition (3 cr)
FScN 4613—Experimental Nutrition (2 cr)
FScN 5621—Nutrition and Metabolism (4 cr)
Phsl 3051—Human Physiology (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
VPB 2032—General Microbiology with Laboratory (4 cr)
or MicB 2032—General Microbiology with Laboratory (4 cr)
or MicB 3301—Biology of Microorganisms (5 cr)

Nutrition

The nutrition option (also referred to as the Didactic Program in Dietetics) offers preparation in the basic sciences and liberal education, a background in food science, and a focus on human needs related to nutrition. Students identify several areas of interest and develop a varied portfolio of competence. Work experience in nutrition, elective courses, and extracurricular activities develop communication and leadership skills. Graduates of the program take positions in various food-related fields, including nutrition, industry, and community programs. Students who plan to become registered dietitians must meet the American Dietetic Association requirements. Graduates who have a cumulative GPA of 3.00, strong work experience in nutrition, demonstrated leadership skills, and who are highly recommended, may apply for a postbaccalaureate dietetic internship.

Additional Courses

FScN 3614—Nutrition Education (3 cr)
FScN 3615—Sociocultural Aspects of Food, Nutrition, and Health (3 cr)
FScN 3731—Food Service Operations Management Lab (2 cr)
FScN 3732—Food Service Operations Management (3 cr)
FScN 4614—Community Nutrition (3 cr)
FScN 4665—Medical Nutrition Therapy I (3 cr)
FScN 4666—Medical Nutrition Therapy II (3 cr)
FScN 4732—Food and Nutrition Management (3 cr)
Math 1031—College Algebra and Probability (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)

Choose one of the following:
FScN 4111—Food Chemistry (3 cr)
FScN 4121—Food Microbiology and Fermentations (3 cr)

Coordinated Program in Dietetics

Students can apply, before their junior year, to the University's Coordinated Program in Dietetics and complete both the academic and professional experience requirements within two years.

The basic curriculum is similar to that specified under Required Courses for All Options, but also includes field experience courses in which didactic and clinical phases of instruction are coordinated. A detailed plan of the program may be obtained from the Department of Food Science and Nutrition. A limited number of students are admitted to the program each year. Minnesota law requires each student admitted to a supervised practice in dietetics to have a criminal background check conducted by the state of Minnesota. The dietetic program director arranges for the background check. Failure to pass the background check results in dismissal from the program.

Additional Courses

(Nutrition Option plus field experiences)
FScN 3614—Nutrition Education (3 cr)
FScN 3615—Sociocultural Aspects of Food, Nutrition, and Health (3 cr)
FScN 3662—Introduction to Dietetic Practice (2 cr)
FScN 3732—Food Service Operations Management (3 cr)
FScN 3796—Field Experience in Food Service Management (3 cr)
FScN 4596—Field Experience: Community Nutrition (3 cr)
FScN 4614—Community Nutrition (3 cr)
FScN 4665—Medical Nutrition Therapy I (3 cr)
FScN 4666—Medical Nutrition Therapy II (3 cr)
FScN 4696—Field Experience: Medical Nutrition Therapy I (6 cr)
FScN 4732—Food and Nutrition Management (3 cr)
FScN 4796—Field Experience in Food and Nutrition Management (3 cr)
FScN 4896—Field Experience: Medical Nutrition Therapy II (3 cr)
FScN 4996—Field Experience: Medical Nutrition Therapy III (3 cr)
Math 1031—College Algebra and Probability (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)

Choose one of the following:
FScN 4111—Food Chemistry (3 cr)
FScN 4121—Food Microbiology and Fermentations (3 cr)

Nutrition Science

The nutrition science option is for students planning to do graduate work in nutrition, related sciences, or professional programs such as medicine or dentistry.

Additional Courses

Biol 2012—General Zoology (4 cr) or another advanced biology course
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Chemistry Lab (4 cr)
FScN 4111—Food Chemistry (3 cr) or an advanced chemistry course
FScN 5622—Vitamin and Mineral Biochemistry (3 cr)
FScN 5623—Regulation of Energy Balance (2 cr)
GCB 3022—Genetics (3 cr)
or Biol 4003—Genetics (3 cr)
Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
Phys 1201—General Physics I (5 cr)
Phys 1202—General Physics II (5 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 3021—Introduction to Probability and Statistics (3 cr)
or Stat 5021—Statistical Analysis (4 cr)

Nutrition Minor

For those having completed Biol 1009, Chem 1022, and Phsl 3051:

FScN 1112—Principles of Nutrition (3 cr)
FScN 3612—Life Cycle Nutrition (3 cr)
FScN 4612—Human Nutrition (3 cr)
Select two courses from the following: FScN 3614, 3615, 4613, 4614, and 5621

Science in Agriculture

B.S.

The science in agriculture major is an interdisciplinary program that provides a thorough grounding of biological/physical science and mathematical principles and their applications to food and agriculture. Students select an area of emphasis within the major or construct an individualized program. Students also complete an undergraduate research thesis under the guidance of a faculty member in one of the host departments.

The major is excellent preparation for employment in bachelor's degree-level research positions as field or laboratory specialists in academia, government, or industry. The major also prepares students for graduate studies in the disciplines represented by the host departments (agronomy and plant genetics, animal science, entomology, food science and nutrition, horticultural science, plant pathology, and soil science) and related areas, as well as in veterinary or human medicine. Students considering veterinary medicine should consult the science in agriculture/doctor of veterinary medicine joint degree option.

The host departments for the major offer opportunities and facilities for doing scientific research. Students may offset some educational costs and gain experience by working part-time as undergraduate technicians on research projects of the Minnesota Agricultural Experiment Station. Experience may also be gained by working on a University, government, or industry internship through the Professional Experience Program.

COAFES' Mentor Program matches students with alumni who are leaders in the student's field of study and provides opportunities for students to learn, ask questions, and talk candidly with professionals.

Degree Requirements

Students must complete at least 120 credits to graduate, including required credits in the major. Faculty academic advisers help students select electives, an undergraduate thesis topic, and a thesis mentor.

Students must complete the University's liberal education requirements; for more information, see page 31 of this catalog. Frequently, courses in the foundation requirements also apply toward completion of liberal education requirements. All required courses must be taken A-F, and a grade of at least C- is required in all professional courses and area of emphasis courses.

Required Courses

Foundation Requirements

BioC 3021—Biochemistry (3 cr)
Biol 1009—General Biology (4 cr)
Biol 4003—Genetics (3 cr)
or GCB 3002—Genetics (3 cr)
or Agro 4401—Plant Genetics and Breeding (4 cr)
or Hort 4401—Plant Genetics and Breeding (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Chemistry Lab (3 cr)
Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
MicB 2032—General Microbiology (4 cr)
or VPB 2032—General Microbiology (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentation (3 cr)
Rhet 3562—Technical and Professional Writing (4 cr)
Phys 1101—Fundamental Physics I (4 cr)
or Phys 1301—Introductory Physics I (4 cr)
Phys 1102—Fundamental Physics II (4 cr)
or Phys 1302—Introductory Physics II (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)
or AnSc 2211—Biometrics for Livestock (3 cr)
or Agro 4104—Experiment Design/Plot Techniques (3 cr)

Professional Requirements

ScAg 1001—Orientation to Science in Agriculture (1 cr)
ScAg 1501—Biotechnology, People, and the Environment (3 cr)
ScAg 5009—Undergraduate Research Thesis (6 cr)

Areas of Emphasis

Animal Science (24 cr)*

AnSc 1101—Introductory Animal Science (4 cr)
AnSc 2301—Systemic Physiology (4 cr)
AnSc 2401—Animal Nutrition (3 cr)
AnSc 3221—Animal Breeding (4 cr)
Plus at least 9 additional credits from AnSc 1011, 1403, 3203, 3305, 3327, 3511, 4011, 4401, 4403, 4405, 4501

**Students interested in poultry study should inquire about courses available through the Midwest Poultry Consortium. Students should check with their adviser, the Department of Animal Science, or COAFES.*

Biotechnology (22-25 cr)

AnSc 2221—Animal Biotechnology (4 cr)
BAE 3013—Engineering Principle of Molecular and Cellular Processes (3 cr)
Hort 4071—Applications of Biotechnology to Plant Improvement (4 cr)
Phil 3305—Medical Ethics (4 cr)
or Biol 4501—Social Uses of Biology (3 cr)
ScAg 1502—Biotechnology Laboratory (2 cr)

One of the following:
Agro 1102—Crops, Environment, and Society (4 cr)
AnSc 1101—Introductory Animal Science (4 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)
Soil 2125—Basic Soil Science (4 cr)

One of the following:
AnSc 2301—Systemic Physiology (4 cr)
FScN 4121—Food Microbiology and Fermentation (3 cr)
PBio 5414—Plant Cell and Molecular Biology (3 cr)
Soil 4601—Soils and Pollution (3 cr)

Food Science (21 cr)

FScN 1112—Principles of Nutrition (3 cr)
FScN 3102—Introduction to Food Science (3 cr)
FScN 4121—Food Microbiology and Fermentation (3 cr)
Plus at least 12 credits from FScN 4111, 4122, 4131, 4312, 4331, 4332

Nutrition (22 cr)

FScN 1112—Principles of Nutrition (3 cr)
FScN 3612—Lifecycle Nutrition (3 cr)
FScN 4612—Human Nutrition (3 cr)
FScN 5621—Nutrition and Metabolism (4 cr)
Plus at least 9 additional credits from AnSc 4401, 4403, 4405, FScN 2103, 4103, 4613, 5622, 5623,

Plant Science (26-27 cr)

Agro 1101—Biology of Plant Food Systems (3 cr)
or Hort 1001—Plant Propagation (4 cr)
Agro 2501—Plant Identification for Urban and Rural Landscapes (2 cr)
Agro 3005—Applied Crop Physiology and Development (2 cr)
and Biol 3005—Plant Function Laboratory (2 cr) (concurrent registration required)
or Hort 3005—Environmental Effects on Horticultural Crops (2 cr)
and Biol 3005—Plant Function Laboratory (2 cr) (concurrent registration required)
Agro 4401—Plant Genetics and Breeding (4 cr)
or Hort 4401—Plant Genetics and Breeding (4 cr)
Biol 2022—General Botany (3 cr)
Ent 3001—Insects and Insect Management (1 cr)
Ent 3005—Insect Biology (concurrent with Ent 3001) (2 cr)
PlPa 2001—Introductory Plant Pathology for Horticulturists (3 cr)
or PlPa 2002—Diseases of Field Crops (3 cr)
Soil 2125—Basic Soil Science (4 cr)

Soil Science (20 cr)

Soil 2125—Basic Soils (4 cr)
Soil 3221—Soil Conservation (3 cr)
Soil 3416—Plant Nutrients (3 cr)
Soil 3612—Soil and Environmental Biology (3 cr)
Soil 4511—Field Study of Soils (2 cr)
Plus at least 6 credits from Soil 4601, 4121, 5211, 5232, 5515, 5555

Individualized Area of Emphasis

Students wishing to design a program with an individualized area of emphasis should consult with their adviser. Individualized programs must be approved by the major coordinating committee and have at least 21 credits, plus electives, to reach 120 credits required for graduation.

Final Project

Students must complete 6 credits of ScAg 5009—Undergraduate Research Thesis.

Science in Agriculture/Doctor of Veterinary Medicine Joint Degree

The science in agriculture/doctor of veterinary medicine joint degree is a cooperative program between COAFES and the College of Veterinary Medicine (CVM). Students who satisfy the specified curriculum requirements earn a B.S. in science in agriculture and, later, a doctor of veterinary medicine from CVM.

New freshmen enrolling in the science in agriculture major may complete three years of undergraduate coursework and then apply to CVM. Upon being accepted into CVM and successfully completing the courses specified in the first semester of the veterinary medicine curriculum, students earn the B.S. degree from COAFES.

The program gives highly qualified students the opportunity to earn both a B.S. degree and a D.V.M. degree in seven years. It also allows integration of a significant set of animal science courses in the student's preparation for veterinary education.

The program is only available to students who enter COAFES with no previous coursework and start in fall semester. The science in agriculture/D.V.M. curriculum is very structured, and the COAFES portion must be completed in three academic years. COAFES students enrolled in the program must meet CVM application standards; admission is competitive. COAFES students applying under the agreement receive special consideration because of the animal knowledge and experience gained in the animal science courses required in the curriculum.

Application to CVM must be made in the junior year. Students not admitted to CVM are expected to complete the normal science in agriculture requirements for the B.S. degree. Students can also reapply to CVM or any other college of their choice at a later date.

AnSc 1101—Introductory Animal Science (4 cr)
AnSc 2301—Systemic Physiology (4 cr)
AnSc 2401—Animal Nutrition (3 cr)
AnSc 3305—Reproductive Biology in Health and Disease (4 cr)
AnSc 3221—Animal Breeding (4 cr)
Plus two from AnSc 4401, 4403, 4405, 4501
Plus one from AnSc 4601, 4603, 4604, 4605
Plus fall semester, first-year veterinary courses

Note: Successful completion of the first semester in CVM constitutes the fourth year of the science in agriculture/D.V.M. joint program and leads to a bachelor's degree.

Scientific and Technical Communication

B.S.

Scientific and technical communicators apply modern techniques and technologies to the distribution of knowledge in industry, business, education, and government. They write and design information for audiences ranging from scientists to management to consumers of technical products and services. To accomplish their objectives, scientific and technical communicators apply principles of audience analysis, writing and editing, usability and testing, visual communication, communication technology, communication research and theory, and oral communication. The program offers an interdisciplinary curriculum that combines theory and practice in a program flexible enough to allow students to plan a course of study appropriate to their career goals.

Steps for Admission—Students who wish to major in scientific and technical communication should take the following steps:

Step 1. Apply for admission to COAFES.

Step 2. Make an appointment to meet with the assistant major coordinator at rhetamc@umn.edu or 612-624-4710 for suggestions on coursework for the first year in the program.

Step 3. Complete liberal education requirements and introductory Rhetoric classes. The assistant major coordinator helps tailor the program up to this point.

Step 4. Complete upper division coursework, including an internship.

After the first year in the program (Step 3), students are assigned a faculty advisor who helps them meet educational and career objectives and plan upper division coursework (Step 4). Students should meet with their adviser at least once per term to discuss the courses they plan to take the next term, as well as to discuss personal and professional development as a technical communicator.

Degree Requirements

Students must complete at least 120 credits to graduate, including 66 credits in the major. Students must also complete the University's liberal education requirements. All required courses must be taken A-F, and a grade of at least C- is required in all major degree requirements.

Required Courses

Equivalent transfer courses are accepted in all areas (except for required rhetoric courses). At least 30 credits must be completed in the Department of Rhetoric, as follows.

Entrance to Major (2 cr)
Rhet 1001—Introduction to Scientific and Technical Communication (2 cr)

Written Communication (10 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
Rhet 4561—Editing and Style for Technical Communicators (3 cr)
Choose one from the following:
Rhet 1152W—Writing on Issues of Science and Technology (4 cr)
Rhet 5664W—Science Writing for Popular Audiences (3 cr)

Oral Communication (6 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3257—Scientific and Technical Presentations (3 cr)

Professional Practice (9 cr)
Rhet 4196—Internship in Scientific and Technical Communication (3-6 cr)
Rhet 3266—Group Process, Team Building, and Leadership (3 cr)
Choose one from the following:
Rhet 4165—Managerial and Organizational Communication, Planning, and Change (3 cr)
Rhet 4573—Writing Proposals and Grant Management (3 cr)
Rhet 5534—Designing Technical Training for Intercultural Audiences (3 cr)
Rhet 5562—Theory and Practice in International Business Communication (3 cr)

Research (6 cr)
Choose two from the following:
Rhet 4501—Usability and Human Factors in Technical Communication (3 cr)
Rhet 5258—Information-Gathering Techniques in Scientific and Technical Communication (3 cr)
Rhet 5511—Research in Scientific and Technical Communication (3 cr)

Theory (8 cr)
Rhet 3221W—Theories of Human Communication (4 cr)
Rhet 3701W—Rhetorical Theory and Scientific and Technical Communication (4 cr)

Science, Technology, and Society (9 cr)
Rhet 3371—Technology, Self, and Society (3 cr)
Choose two from the following:
Rhet 3108W—Gender and the Rhetoric of Science and Technology (4 cr)
Rhet 1302—Science, Religion, and the Search for Human Nature (3 cr)
Rhet 3577W—Rhetoric, Technology, and the Internet (3 cr)

Print and Media Design (10 cr)
Rhet 3671—Project Design and Development I (3 cr)
Rhet 3672—Project Design and Development II (3 cr)
Choose one from the following:
Rhet 4662W—Emerging Technology in Technical Communication (4 cr)
Rhet 4105W—Corporate Video for Technical Communicators (4 cr)

Scientific or Technical Emphasis (6 cr)
2xxx or above course in science or technology (3 cr)
3xxx or above course in science or technology (3 cr)
The scientific or technical emphasis area helps students develop familiarity with a science or technology in order to communicate with professionals in that field. Students must select courses in a scientific or technical area in consultation with their adviser. Courses may be from multiple departments, but should combine to form a single, cohesive emphasis.

Final Project

All students must participate in an internship, Rhet 4196—Internship in Scientific and Technical Communication (3-6 cr), as a requirement for the professional practice area.

University rhetoric students participated with nine other schools worldwide on an international team dealing with technology and community-building sponsored by Apple, Inc.

Department of Rhetoric Minors

The Department of Rhetoric offers four minors

- Designing documents with new and emerging technologies
- Internet, science, and society
- Land, nature, and environmental values
- Technical communication

A description of each minor is given below. Note that some of the required courses for these minors have prerequisite courses; for example, a prerequisite to taking Rhet 3257—Scientific and Technical Presentations is Rhet 1223—Oral Presentations in Professional Settings. Request a copy of the *Minors Brochure* from the Department of Rhetoric or contact the Department of Rhetoric program secretary at 612-624-3445 for more information.

Designing Documents With New and Emerging Technologies

Minor Only

The minor focuses on designing effective documents using both traditional and emerging technologies. Students learn to design written messages using computer technologies (such as PowerPoint); visual messages using photography, digital imaging, and video; and online and Web messages using multimedia, World Wide Web technologies, and streaming audio and video. Message design components include audience analysis and rigorous evaluation of document effectiveness. This minor differs from the technical communication minor by its focus on emerging technologies and the requirement that students take a design project in which they work collaboratively on educational technology projects with faculty mentors.

For more information, contact the major coordinator of the Scientific and Technical Communication Program, Department of Rhetoric.

Students must have a GPA of at least 2.00 in the required courses and a minimum of 15 credits to receive the minor.

Required Courses

Rhet 3671—Project Design and Development I (3 cr)
Rhet 3672—Project Design and Development II (3 cr)
Rhet 4501—Usability and Human Factors in Technical Communication (3 cr)
Rhet 4662W—Emerging Technologies in Scientific and Technical Communication (4 cr)

Plus one of the following:

Rhet 3101—Functional Photography (3 cr)
Rhet 3257—Scientific and Technical Presentations (3 cr)
Rhet 3401—Internet Communication: Tools and Issues (3 cr)
Rhet 4105—Corporate Video for Technical Communicators (4 cr)

Internet, Science, and Society

Minor Only

This minor introduces students to the fields of Internet studies/technology studies then allows students to select from elective courses that focus on an area of interest. Areas of study might include legal or social issues, such as intellectual property on the Internet or ways in which gender stereotypes are both reinforced and modified online; how scientific and technical information is conveyed on the Internet and how the Internet is playing an important role in our ability to share cutting-edge information; or how controversies, such as current debates over genetically modified foods, are played out in cyberspace.

Several courses in the minor include guest speakers from the affiliated faculty of the Internet Studies Center, such as Internet law experts or soil scientists with expertise in making scientific information available on the Internet. Students have the opportunity to publish their work on the Internet Studies Center Web site and to attend guest lectures by internationally known Internet studies scholars.

Students work with an adviser in their home department and an adviser in Rhetoric. Students must complete at least 18 credits to complete the minor.

Required Courses

Rhet 3371—Technology, Self, and Society (3 cr)
Rhet 3401—Internet Communication: Tools and Issues (3 cr)
Rhet 3577W—Rhetoric, Technology, and the Internet (3 cr)

Electives (3 cr)

Rhet 3108W—Gender and the Rhetoric of Science and Technology (4 cr)
Rhet 3291—Independent Study (3 cr)
Rhet 4105W—Corporate Video for Technical Communicators (4 cr)
Rhet 4196—Internship in Scientific and Technical Communication (3-6 cr)

Outside electives (6 cr)

Students should work with their minor adviser to select 6 credits of approved coursework outside the Department of Rhetoric. The selected courses should complement the minor.

Land, Nature, and Environmental Values

Minor Only

This is a multidisciplinary minor based in the humanities. The minor complements professional and scientific degree programs in COAFES and serves students from other colleges who have an interest in cultural issues relating to the environment. Students are introduced to the historical development, philosophical assumptions, and imaginative expression of the human relationship to nature and are asked to consider implications of issues involving our use of nature. Students write a senior integrative paper relating some aspect of their major field to social, cultural, or historical trends in the larger society.

For assistance in planning a minor in land, nature, and environmental values, see the humanities course coordinator in the Department of Rhetoric.

Students must complete at least 18 credits to complete the minor.

Required Courses

Rhet 3291—Independent Study (3 cr) (The integrative paper; see adviser for approval)

At least five of the following:

Rhet 1152W—Writing on Issues of Science and Technology (4 cr)
Rhet 1302—Science, Religion, and the Search for Human Nature (3 cr)
Rhet 1315—The Land in American Experience (3 cr)
Rhet 3270—Special Topics (1-3 cr)
Rhet 3371—Technology, Self, and Society (3 cr)
Rhet 3383—In Search of Nature (3 cr)

Technical Communication

Minor Only

The minor provides theoretical and practical information about how to communicate complex technical information to various audiences. Students take required courses in oral and written communication and in communication technologies. Additional courses (e.g., visual communication, project management, international communication) are selected to complement students' career plans. For help in planning the minor, contact the major coordinator of the Scientific and Technical Communication Program in the Department of Rhetoric.

To complete the minor, students must complete at least 15 credits.

Required Courses

Rhet 3562W—Technical and Professional Writing (4 cr)
Rhet 3257—Scientific and Technical Presentations (3 cr)
Rhet 4561—Editing and Style for Technical Communicators (3 cr)
Plus two additional Rhet courses at 3xxx or higher.

Soil Science

Minor Only

The minor allows students to complete coursework required for the Professional Soil Science Examination for geoscientists. To complete the minor, students must complete at least 20 credits.

Required Courses (18 cr)

Soil 1125—The Soil Resource (4 cr)
or Soil 2125—Basic Soil Science (4 cr)
Soil 3221—Soil Conservation and Water Quality Impacts (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)
Soil 3612—Soil and Environmental Biology (3 cr)
Soil 4601—Soils and Pollution (3 cr)
Soil 4511—Field Study of Soils (2 cr)

Electives (2 cr)

Soil 4021—Environmental Impact Statements (3 cr)
Soil 4216—Contaminant Hydrology (2 cr)
Soil 5515—Soil Genesis and Landscape Relations (3 cr)
Soil 5555—Wetland Soils (3 cr)

Sustainable Agriculture

Minor Only

This minor allows students to study the sustainability of agricultural food systems from an integrated perspective, including coursework, practical experience, and community reflection. Required courses and courses from the foundational clusters—land and public policy; agriculture, environment, and natural resources; and citizens, science, and society—define the students' minor curriculum. In addition, each student works with a minor adviser to design an individualized practical experience in some aspect of sustainable agriculture (i.e., an internship, experiential learning opportunity, etc). In the unique format of community reflection through the *What's Up in Sustainable Agriculture* (*WUSA*) student-led seminar series and the senior capstone, students synthesize their learning about sustainability for local, national and global agricultural food systems. For this minor, students must complete 8-10 credits of required courses and a minimum of 9 credits of foundational coursework, for a total of at least 17 credits.

For more information, contact Dr. Craig Sheaffer, minor coordinator, 612-625-7224 or the Minnesota Institute for Sustainable Agriculture (MISA), 612-625-2738, misamail@umn.edu.

Required Courses (8-10 cr)

Agro 4888—Issues in Sustainable Agriculture (2 cr)
AnSc/Agro 3203—Environment, Global Food Production and the Citizen (3 cr)
Xxxx 4096—Internship/Professional Experience Program (1-3 cr)
Agro 4660—Senior Capstone: Leadership, Decision Making and Problem Solving (2 cr)
(To be taken concurrently with or after completion of Xxxx 4096)

Foundational Course Clusters (9 cr min)

Select one course from each of the following clusters. Other courses may be substituted with approval of the minor adviser and coordinator.

Land and Public Policy

Agro/ApEc/FScN 4103—World Food Problems (3 cr)
ApEc 3041—Economic Development of U.S. Agriculture (3 cr)
Geog 3361—Land Use, Landscapes and the Law (3 cr)
PA 5002—Introduction to Policy Analysis (1.5 cr)
Rhet 1315—The Land in American Experience (3 cr)

Agriculture/Environment and Natural Resources

Agri 3001—Pests and Crop Protection (3 cr)
Agro 1103—Crops, Environment, and Society (4 cr)
Agro 5999—Agroecosystems Analysis (summer field course) (3 cr)
AnSc1101—Introductory Animal Science (4 cr)
Geog 3355—Environmental Quality (3 cr)
Hort 4072—Growing Plants Organically: What It Means to be Green (3 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
Soil 1125—The Soil Resource (4 cr)
or Soil 2125—Basic Soil Science (4 cr)
Soil 3221—Soil Conservation and Land-Use Management (3 cr)

Citizens/Science and Society

AgET 5212 —Safety and Health Issues in Agricultural Work Environments (2 cr)
Geog 3371—Introduction to Urban Geography (3 cr)
PlPa 1001—Microbes, Plants, and People: Social and Economic Impact of Plant Disease (3 cr)
Rhet 3371—Technology, Self, and Society (3 cr)
ScAg 1501—Biotechnology, People, and the Environment (3 cr)
Soc 3451—Urban Community (3 cr)

Water Science

Minor Only

The minor provides students the opportunity to broaden their expertise in the area of water science. Students interested in qualifying as a hydrologist should determine the exact requirements for the Minnesota civil service position by checking the Hydrologist I (Hydrogeology) and Hydrologist I (Water Resources) position descriptions. Students in environmental science in the water resources emphasis are not eligible for a water science minor.

To complete the minor, students must complete at least 20 credits.

Required Courses

EEB 4601—Limnology (3 cr)
or Geo 5701—General Hydrogeology (4 cr)
FR 4114—Forest Hydrology and Watershed Management (3 cr)
Soil 5232—Vadose Zone Hydrology (3 cr)
or Soil 5555—Wetland Soils (3 cr)

Electives

CE 4541—Environmental Water Chemistry (4 cr)
EEB 4605—Limnology Lab (1 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
FR 5153—Forest and Wetland Hydrology (3 cr)
or Geo 5701—General Hydrogeology (4 cr)
Soil 4216—Contaminant Hydrology (2 cr)
Soil 5555—Wetland Soils (3 cr)
or Soil 5232—Vadose Zone Hydrology (3 cr)
Soil 5211—Environmental Biophysics and Ecology (3 cr)
GeoE 4351—Ground Water Mechanics (3 cr)
WRS 5001—Field Methods in Water Resources (3 cr)

This is the College of Architecture and Landscape Architecture section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

College of Architecture and Landscape Architecture

Degree Programs and Minors

College of
Architecture and Landscape Architecture

General Information

The College of Architecture and Landscape Architecture (CALA) seeks to advance the quality and value of the designed environment. Faculty and students address fundamental questions about the meaning and experience of people's physical settings: landscapes, cities, and buildings.

Design education lies at the core of CALA's mission. CALA teaches design as the primary way in which architects, landscape architects, and urban designers shape and explore their ideas. Through design education students develop creative powers of generalization and abstraction using analysis and synthesis. It also gives them a broad understanding of the arts, humanities, and sciences; a knowledge of the appropriate discipline's technology, history, theory, and professional practice; the skills necessary to develop, explore, and describe design ideas; a belief in the aesthetic, ethical, and environmental responsibilities of architects and landscape architects.

Offering the only accredited degrees in architecture and landscape architecture in Minnesota, CALA works within the guidelines of the National Architectural Accrediting Board (NAAB), the Association of Collegiate Schools of Architecture (ACSA), and the Landscape Architectural Accreditation Board (LAAB).

Facilities—CALA's newly renovated and expanded building offers the best facilities in the country in which to study architecture and landscape architecture. Designed by internationally known architect Steven Holl, along with the local firms Vincent James Associates, Ellerbe Becket, and Rozeboom Miller Architects, the building features dramatic interior spaces, new equipment and furnishings, and outdoor teaching areas. The public artist, John Roloff, has also designed a provocative piece for the landscape. In addition to ample classroom, studio, and office space, the college has specialized facilities available for student use. To support design studio activities, the CALA woodshop and its staff provide the tools and skills needed to turn ideas into objects, while the CALA imaging lab has photographic studio facilities and equipment for documenting projects, computer workstations for film scanning and digital video editing, and videos of lectures and presentations given by distinguished teachers and practitioners. The CALA visual resources collection comprises approximately 100,000 slides to support student and faculty research and educational activities. The Architecture and Landscape Architecture Library provides full library services and has a collection of more than 34,675 volumes. The CALA computing center, open seven days a week, supports several operating systems and a variety of graphics software, including AutoCAD and ESRI Geographic Information Systems (GIS) applications, flat bed and slide scanners, large-format plotters, a variety of printers, and video capabilities. Please visit the CALA Web site at <www.cala.umn.edu> for more information on the college's academic resources.

The Design Center for American Urban Landscape (DC/AUL)—DC/AUL, an urban design research unit within CALA, develops interactive educational projects in neighborhoods and communities, addressing national urban design and planning issues. The Design Center's mission is to educate public and private decision makers, professionals, and citizens about the value of design as a strategic partner with economic and human interests in the making of community-based development strategies and sustainable urban landscapes. Students, professionals, and community leaders collaborate on each project.

The Design Institute—This interdisciplinary unit within CALA encompasses several University colleges with design-related programs, including CALA; the Colleges of Education and Human Development, Human Ecology, and Liberal Arts; Hubert H. Humphrey Institute of Public Affairs; and Institute of Technology. The institute seeks to position the University as a world leader in interdisciplinary design scholarship, education, and university-community partnerships. For information about a design minor, see Degree Programs in this section.

Admission

Freshman Admission—Students in their senior year of high school, or those who have a high school degree or recognized equivalent but have not studied at the college or university level, should apply to one of the freshman-admitting colleges through the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455. CALA does not admit freshmen.

Admission to the Majors—The bachelor of science (B.S.) with a major in architecture, the bachelor of arts (B.A.) with a major in architecture, and the bachelor of environmental design (B.E.D.) degree programs have their own admission policies and procedures. For information regarding admission to the B.S. and B.E.D. programs, consult the areas in this section describing each program. For information on the B.A. degree, see the College of Liberal Arts section.

High School Preparation Requirements—If students have not satisfied high school preparation requirements, they will *not* be admitted to the architecture major or the environmental design major in landscape architecture and therefore will not be allowed to take upper division program courses. See Freshman Admission in the General Information section of this catalog.

Degrees/Majors

Undergraduate—CALA offers a nonprofessional bachelor of environmental design (B.E.D.) degree; a nonprofessional bachelor of science with a major in architecture (B.S.) degree; and, in cooperation with the College of Liberal Arts (CLA), a nonprofessional bachelor of arts (B.A.) degree with a major in architecture. The B.S. and the B.A. programs include an accelerated status option to allow qualified undergraduates to complete the undergraduate and master of architecture (M.Arch.) degrees in six years rather than seven. Qualified undergraduates may also complete the nonprofessional B.E.D. and the fully accredited master of landscape architecture (M.L.A.) degrees in six years rather than seven.

Graduate—In conjunction with the Graduate School, CALA offers both professional and postprofessional graduate degree programs in architecture and landscape architecture. Descriptions of these programs are provided in the *Graduate School Catalog*.

Minors

CALA offers minors in architecture and environmental design and an interdisciplinary minor in design. Please see the Degree Programs section for details on these minors.

Graduation Requirements

Students are recommended for graduation after they complete the prescribed curriculum, including required and elective courses to meet the total number of credits required; earn a minimum cumulative GPA of 2.00 overall and in their major; and complete the necessary paperwork and meet the application deadlines.

Two semesters before the expected graduation date, students should have an approved graduation check sheet on file with their department and the college office. In addition, students must turn in their graduation application to the Office of the Registrar. (Deadline extensions are not granted.)

Note: The College of Liberal Arts (CLA) grants a B.A. with a major in architecture. Students should check the CLA section of this catalog for information on CLA graduation.

Professional Registration

CALA provides Minnesota's only accredited professional degree programs in architecture (the M.Arch.) and landscape architecture (the M.L.A.).

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes two types of degrees: the bachelor of architecture and the master of architecture. A program may be granted a five-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards.

Masters degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. However the preprofessional degree is not, by itself, recognized as an accredited degree.

For more information concerning professional registration, contact the Minnesota Board of Architecture, Engineering, Land Surveying and Landscape Architecture, and Interior Design (651-296-2388).

Advising

CALA Student Services Office—The Office of Student Services in CALA serves students from their prospective visit to graduation. The office assists students with registration, course access, degree programs, declaring a major, petitions, graduation clearance, commencement, and other student issues for all three of CALA's majors. It also assists with access to the CALA mentor program, internship information, and career opportunities.

Prospective student advising provides general information about CALA's degree programs, related professional fields in architecture and landscape architecture, admission and program requirements, and college services, and refers prospective graduate students to the appropriate department director of graduate studies.

Advisers are available by appointment or on a walk-in basis. To make an appointment with an adviser or the prospective student adviser, please call 612-626-1000.

Department Advisers—CALA Student Services and the directors of undergraduate studies provide major and department advising for undergraduates in the B.S., B.A., and B.E.D. programs.

Policies

Computer Requirement—Beginning fall 2002, CALA students in studio classes are required to have a laptop computer. For the most current information about computer requirements, visit the CALA Web site at <www.cala.umn.edu/>.

Course Load—The average course load per semester for CALA undergraduates is five courses (13-16 credits) to graduate in four years without taking summer session courses. One credit requires an average of three hours of work each week. Carrying more than 21 credits requires special permission from the college scholastic committee.

Repeating Courses—See Grading and Transcript Policy in the Policies section of this catalog.

Petition Procedures—Petitions are required for deviations from either college or major requirements. CALA students can pick up petition forms from either the CALA Student Services or department office. Petitions are submitted to the CALA Student Services office for a decision. A successful petition requires both college and department approval. To substitute a course for a requirement, the petition must be approved before the student registers for the course. Students should be sure their petitions have been approved before they register.

Academic Progress—Students are expected to make satisfactory progress toward their degree objectives. This means earning a grade of at least C- in all required courses, completing courses undertaken, and maintaining an overall GPA that meets University policies. For students with concerns about their academic progress, early consultation with instructors or an advisor is recommended. CALA evaluates academic progress and scholastic standing using semester and cumulative GPA reviews.

Student Conduct—CALA expects the highest standard of honesty and integrity in the academic performance of its students. When a case of scholastic dishonesty arises, the CALA faculty member who is the instructor for the course may modify the grade for the examination or piece of work in question or the course itself, or may refer the incident to the department head or the appropriate committee. In any case, the instructor must report to the department and to CALA the incident and the action he or she takes. At the time of the action, the student is informed by the instructor of his or her right to ask for a hearing by the committee dealing with student conduct cases. Information on this process is available from the college office.

Grievances—Students with complaints or criticisms about courses or academic policies have recourse through grievance procedures. They are expected to first confer with the course instructor. If no satisfactory solution is reached, the complaint should be presented to the department head. If these informal processes fail, a department-level committee hears the evidence. Further appeals go to college-level and University-level committees. CALA Student Services advisers have experience interpreting college procedures and regulations and can often suggest suitable alternatives to solve a problem.

CALA's newly renovated and expanded building offers the best facilities in the country and features dramatic interior spaces, new equipment and furnishings, and outdoor teaching areas.

Rights to Student Work—The College of Architecture and Landscape Architecture reserves the right to retain for archival or exhibition purposes images of any student work executed as part of a CALA instructional program. In addition, the college reserves the right to document, reproduce, and publish such images in college publications, printed or electronic, for research, publicity, and outreach, giving publication credit to the creator/student.

Special Learning Opportunities and Resources

Summer Honors College for High School Students—Each summer CALA offers architecture-related learning opportunities for talented high school students through the Summer Honors College. This program provides students with an interdisciplinary, hands-on approach to the building arts, as well as an opportunity to explore a broad range of other subjects while receiving college credit.

Visiting Lecturers and Critics—The CALA Lecture Series, aided by funding from supportive alumni and professionals, brings several nationally and internationally known practitioners and educators to the college each semester to address students, faculty, and interested practitioners on various topics in architecture, landscape architecture, and urban design. In addition, CALA has endowment funds designated to support visits by outstanding scholars. The H. W. S. Cleveland Visiting Professorship in Landscape Architecture and the Cass Gilbert Visiting Land-Grant Chair in Architecture endowments provide support for distinguished visitors who typically conduct seminars, give lectures, and, when appropriate, participate in design studio reviews. Students also receive design critiques from local and regional educators and practitioners during end-of-semester reviews.

Continuing Education—CALA offers continuing education courses for architecture and landscape architecture professionals through its Continuing Professional Studies program. Courses are designed to meet the content interests of the practitioner and are offered in short, convenient seminar formats. For up-to-date information on classes, programs, and curriculum see <www.cala.umn.edu/cps>.

International Programs

Students are encouraged to incorporate a study abroad experience into their degree program. Each year CALA has arranged study trips for architecture and landscape architecture students to a variety of locations. In recent years these have included Europe, China, Meso-America, the Middle East, and the American Southwest.

CALA currently offers an undergraduate study abroad program in Oaxaca, Mexico. The city dates from 1529 when the Spanish first drew the outline of Oaxaca's central square in the ground and is well known for its architectural heritage and as a city of the arts. This residential program meets specific degree requirements in the B.A. and the B.S. degree programs.

An exhibition of student work from the graduate and undergraduate study abroad programs is held at the beginning of fall semester.

For more information contact the International Service and Travel Center, 94 Blegen Hall (612-626-4782); the Global Campus, 230 Heller Hall (612-626-9000); or the CALA Student Services office (612-626-1000).

Career Information

CALA departments have a long history of close association with their respective professional communities. Design professionals teach in the studios as adjunct faculty, and students are strongly encouraged to gain professional work experience before graduating from their professional degree program. A portion of the student's work experience may be applied to the three-year practice requirement for the professional registration examination.

The CALA Career Fair, featuring architecture and landscape architecture firms and Graduate School information, is held every spring.

Student Organizations

Membership and participation in student organizations add a valuable dimension to a student's academic career and contribute to professional development.

American Institute of Architecture Students (AIAS)—This independent, student-run organization informs students of current issues in architecture and promotes excellence in architectural education. AIAS is involved in various activities on local and national levels, including competitions, design charrettes, social activities, portfolio workshops, and college committee membership. In addition, AIAS works in conjunction with the American Institute of Architects and local firms to give students a tangible connection to the profession.

Minnesota Chapter of the American Society of Landscape Architecture Students (MASLAS)—This group, affiliated with the American Society of Landscape Architects, informs students of current issues in landscape architecture and provides an excellent connection to the profession. The group is involved in various activities, including the lecture series, competitions, design charrettes, social activities, and portfolio workshops.

CALA Student Board—The student board consists of 12 advanced undergraduate and graduate students. The board works toward the continued growth of a good working academic environment for students and faculty.

CALA Mentor Program—The mentor program has its roots as a student-founded and student-run organization. The mission of the program is to foster meaningful relationships between students and professionals of architecture, landscape architecture, and related fields.

Directory

(area code 612)

Administrative Offices

Office of the Dean
101 Architecture
626-9068

Student Services
107 Architecture
626-1000

Departments and Programs

Department of Architecture
145 Architecture
624-7866

Department of Landscape Architecture
144 Architecture
625-6860

Design Center for American Urban Landscape
1 Architecture
627-1850

Design Institute
110 Architecture
625-3373

Landscape Studies Center
1425 University Avenue SE
Minneapolis
625-6860

CALA Web Site
<www.cala.umn.edu/>

College of Architecture and Landscape Architecture

Degree Programs and Minors

Architecture

Department of Architecture

B.S.

Architecture encompasses the making and study of the buildings and environment that we inhabit. The concerns of architecture involve a variety of areas of study, including the art of representing built projects through drawings and computer graphics; the technology of building structure, building materials, and natural and mechanical systems; the history, theory, and art of making, using, and understanding buildings as cultural artifacts for human use; and the practice of architecture in the context of urban form and business economics.

The bachelor of science degree with a major in architecture (B.S.) provides instruction in history, representation, design, theory, and technology, emphasizing the development of architecture as a language of form, space, and order. The B.S. requires an understanding of social, cultural, and physical contexts as a foundation for the examination of the methods, values, precedents, and material reality characteristic of the process of shaping natural and built environments. The major combines core prerequisites with a focused introduction to the practice of architecture, including required courses in representation, history, theory, technology, and design processes.

The B.S. degree program offers an in-depth study of architecture in the context of a liberal education by requiring two years of design study and upper division architecture electives (see the College of Liberal Arts section of this catalog for more information on the B.A. degree). The B.S. degree is used primarily as preparation for professional study in architecture or related fields at the graduate level, or for employment or study in architecture-related fields that do not require a professional degree such as urban design or planning, housing development, construction management, or real estate development. The B.S. degree program establishes a strong design foundation that serves a variety of careers and provides flexibility as individual opportunities change. A professional degree in architecture is required to qualify for licensure as an architect in Minnesota.

Beginning fall 2002, CALA students in studio classes must have a laptop computer. For the most current information about computer requirements, visit the CALA Web site at <www.cala.umn.edu/>.

Admission Requirements—For the bachelor of science (B.S.) degree with a major in architecture, students enrolled at the University may transfer to CALA the semester they complete 55-60 credits, including all preparation courses. As pre-architecture majors pursuing the B.S. degree, students file an *Application for Change of College* form and designate CALA as the college to which transfer is requested.

Students transferring into the University must enter through CLA or one of the other transfer admitting colleges. Transfers with 30 credits who enter through CLA may declare a pre-architecture major immediately upon admission. Students are admitted to the architecture major based on space availability and academic record. A minimum GPA of 2.50 is required and an overall GPA of 2.80 is recommended.

Application deadlines are November 1, March 1, and August 1. Students complete the following steps before an application deadline.

1. Complete all required architecture and general education courses listed under "Preparation for the Major" and liberal education requirements, (may include current enrollment).
2. Meet with a College of Architecture and Landscape Architecture undergraduate adviser in the Office of CALA Student Services (612-626-1000). Bring a copy of the completed Pre-Architecture Planning Sheet and a current unofficial transcript to the appointment.

Students interested in taking CALA courses but not earning a degree should enroll in CALA as a non-degree seeking student through the Office of Admissions.

Degree Requirements

Students must complete at least 120 credits: 60 credits of pre-architecture study followed by 60 credits of coursework after admission to the major. At least 47 credits must be in the major.

During their program, students should maintain a portfolio of originals or duplications of all freehand drawings, projects, and architecture studio designs. A portfolio is required for application to the accelerated program and the graduate professional degree program.

All architecture-designated courses (Arch) and the required general education courses in math, physics, and English composition must be taken A-F with grades of C- or better to satisfy degree requirements and to progress to sequence courses.

Required Courses

Preparation for the Major (31 cr)

Required General Education Courses (13 cr)

EngC 1011—University Writing and Critical Reading (4 cr)
Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4 cr)
Phys 1101—Fundamental Physics I (4 cr)
or Phys 1201—General Physics I (5 cr)

The architecture and landscape architecture career fair gives students the opportunity to meet practicing professionals and discuss career tracks.

Architecture Courses (18 cr)

Representation (3 cr)

Arch 1301—Introduction to Drawing in Architecture and Landscape Architecture (3 cr)

History and Theory (12 cr)

Arch 1401—The Designed Environment (3 cr)

Arch 3401W—Environmental Design and the Sociocultural Context (3 cr)

Arch 3411—Architectural History to 1750 (3 cr)

Arch 3412—Architectural History Since 1750 (3 cr)

Technology (3 cr)

LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)

Architecture Major Requirements (47 cr)

Representation (3 cr)

Arch 3301—Drawing for Design in Architecture (3 cr)

Design (22 cr)

Arch 5281—Undergraduate Architecture Studio I (6 cr)

Arch 5282—Undergraduate Architecture Studio II (6 cr)

Arch 5283—Undergraduate Architecture Studio III (6 cr)

Arch 5284—Undergraduate Architecture Studio IV (4 cr)

History (3 cr)

Arch 54xx—History (3 cr)

Technology (4 cr)

Arch 5501—Environmental and Material Forces in Architecture (4 cr)

Arch 5511—Building Systems

Arch 5513—Thermal Design in Architecture

Arch 5571—Architectural Structures

Additional upper division courses

Select 9 to 12 credits of 3xxx-5xxx architecture electives

Select 9 credits of 3xxx-5xxx electives outside the major

Accelerated Status in Architecture

This status is a competitive opportunity for qualified undergraduates to complete the B.S. degree with a major in architecture and the M.Arch. degree in six years rather than seven. Accelerated status applicants must complete all but 14 credits of upper division architecture courses before their senior year.

In this program students complete the first year of the graduate professional degree program in their senior year; courses carry upper division credit and complete the B.S. degree. Admission to accelerated status does not guarantee admission to the graduate professional program; separate requirements, such as the Graduate Record Examination (GRE) and other application documents, must be submitted in January of the year admission to the graduate program is sought. For more information about accelerated status, consult the Department of Architecture director of undergraduate studies or the CALA Office of Student Services.

To be considered for accelerated status, students must be enrolled at the University as a B.S. or B.A. major in architecture, have completed one year of architecture design studio (Arch 5281, Arch 5282), have completed 90 credits, and have earned an overall GPA of 3.50. See an adviser in the CALA Student Services office for additional criteria. Deadline for consideration is March 15.

Architecture Minor

An architecture minor introduces the foundational ideas of the discipline as a social, cultural, historic, and environmental construct. It requires at least 18 credits and a minimum grade of C- in all courses.

Arch 1401—The Designed Environment (3 cr)

Arch 3401W—Environmental Design and the Sociocultural Context (3 cr)

LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)

Nine credits are electives within an interest area and must be in upper division Arch courses (3xxx-5xxx). See an architecture adviser in the CALA Student Services office for more information and to declare the minor. A maximum of 9 transfer credits may be used toward the minor. A maximum of three courses taken for a major may also be used toward the minor.

Environmental Design

Department of Landscape Architecture

B.E.D.

Landscape architecture integrates the design, planning, and management of the landscape to create environments that combine ecological function and human aspirations for community, health and safety, and beauty.

The B.E.D. in landscape architecture provides a broad background in the biological, physical, and social sciences and the liberal arts as they apply to design. Courses introduce students to the history, theory, and practice of landscape architecture. Design experiences are supplemented by courses in representation, technology, history, and theory. The B.E.D. program may be used as preparation for professional study in landscape architecture or related fields at the graduate level, or for employment in the environmental design and planning fields that does not require an accredited professional degree.

Projects include large-scale regional landscape planning; design of exterior environments for working, living, and recreation; commercial, institutional, and industrial development; transportation systems; and multiple-use areas. Professional services include studies of land-use allocation and management, detail grading, construction drawings, and planting plans. Landscape architects often collaborate on projects with other professionals such as architects, planners, engineers, geographers, physical scientists, biologists, ecologists, and social scientists.

The Department of Landscape Architecture offers three degrees: the preprofessional bachelor of environmental design in landscape architecture (B.E.D.); the professional master of landscape architecture (M.L.A.), required to become a registered landscape architect; and the master of science (M.S.), a research-oriented degree allowing a specialized focus within landscape architecture.

The three degree programs seek to integrate an artistic understanding of landscape design with an ecological understanding of natural and cultural systems. National leadership in research, active testing of design ideas at the local and national level, and the integration of these experiences into the classroom offer a powerful springboard for design innovation. Collaborative opportunities within the college and University allow students to explore and realize the potentials of landscape architecture and the need for ecological responsibility in design and planning.

Beginning fall 2002, CALA students in studio classes are required to have a laptop computer. For the most current information about computer requirements, visit the CALA Web site at <www.cala.umn.edu/>.

Admission Requirements—Students enrolled at the University may declare an environmental design major at any point after they have completed all high school preparation requirements (see High School Course Preparation in the General Information section of this catalog) and 30 credits with a GPA of 2.00. Students declare the major by filing an *Application for Change of College;* students designate CALA as the college to which transfer is requested, with a major in environmental design.

Students transferring into the University may declare an environmental design major immediately upon admission if they have completed all high school preparation requirements and at least 30 semester credits with a GPA of 2.50.

Degree Requirements

Students must complete at least 120 credits, including at least 51 credits in the major.

Students must complete all program, college, and University requirements including the University of Minnesota, Twin Cities liberal education requirements. All LA-designated courses must be taken A-F, with grades of C- or better.

Accelerated Status Option—The department also offers an accelerated status option through the B.E.D. program. The accelerated status option admits a limited number of students annually and allows qualified undergraduates to complete the B.E.D. and M.L.A. in six years rather than seven years.

Applicants for the accelerated status must complete the first three years of the B.E.D. degree requirements before their senior year. Students must complete the first year of the professional degree program in their undergraduate senior year. These courses carry upper division credit and satisfy senior year B.E.D. requirements.

Accelerated status is granted on a competitive basis and does not admit any student to the graduate professional program. Separate requirements, such as letters of recommendation, a letter of interest, and other application documents, must be submitted in January of the year that students are seeking admission to the graduate program. B.E.D. graduates who have completed the accelerated status option and applied to the M.L.A. professional degree program will receive advanced standing in the M.L.A. program upon acceptance by the Department of Landscape Architecture and the Graduate School.

Required Courses

I. Foundation Courses

Landscape Architecture

LA 1101—Introduction to Design Thinking (4 cr)

LA 1301—Introduction to Drawing in Architecture and Landscape Architecture (3 cr)

LA 1401—The Designed Environment (3 cr)

General Education

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)

or EngC 1012—University Writing and Critical Writing, Emphasis on Cultural Diversity (4 cr)

Rhet 1223—Oral Presentations in Professional Settings (3 cr)

or Comm 1101—Introduction to Public Speaking (3 cr)

The following courses are recommended (not required) to fulfill University liberal education requirements for at least 8 credits of physical and biological sciences.

Biol 1001—Introductory Biology I: Evolutionary and Biological Perspectives (4 cr)

Biol 1009—General Biology (4 cr)

Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)

Geo 1004—Physical and Historical Geology of Minnesota (4 cr)

Geog 1403—Biogeography of the Global Garden (4 cr)

Soil 1125—The Soil Resource (4 cr)

The following courses are recommended (not required) to fulfill University liberal education requirements for at least 15 credits of social sciences and humanities.

Geog 1301—Introduction to Human Geography (4 cr)

Geog 3371—Introduction to Urban Geography (3 cr)

Geog 3373—The Changing Form of the City (3 cr)

II. Advanced Courses

Landscape Architecture

Arch 3301—Drawing for Design in Architecture (3 cr)

Arch 3401—Environmental Design and the Sociocultural Context (3 cr)

EEB 3001—Ecology and Society (3 cr)

FR 3131—Geographical Information Systems for Natural Resource Analysis (3 cr)

LA 3001—Introduction to Landscape Architectural Design (3 cr)

LA 3411—Architectural History to 1750 (3 cr)

or LA 3412—Architectural History Since 1750 (3 cr)

LA 3501—Environmental Design and its Biological and Physical Context (3 cr)

LA 3204—Landscape Ecology (3 cr)

LA 3413—Introduction to Landscape Architectural History (3 cr)

LA 5571—Landscape Construction: Landform Systems and Spatial Performance (3 cr)

The following courses are recommended (not required) to fulfill the two-course 3xxx-5xxx (6-8 cr) requirement in landscape planning and design.

Arch 5452—Architecture: Design, Form, Order, and Meaning (3 cr)

Arch 5711—Design Principles of the Urban Landscape (3 cr)

Arch 5724—Meanings of Place (3 cr)

FR 4501—Urban Forest Management (3 cr)

Geog 3355W—Environmental Quality (3 cr)

Geog 3361W—Land Use, Landscapes, and the Law (3 cr)

Geog 3371W—Introduction to Urban Geography (3 cr)

Geog 3373W—Changing Form of the City (3 cr)

Geog 3605V/W—Geographical Perspectives on Planning (4 cr)

Geog 5372W—American Cities II: Land Use, Transportation, and the Urban Economy (4 cr)

Geog 5393—The Rural Landscape (3 cr)

Hort 4021—Landscape Design, Implementation, and Management I (4 cr)

Hort 5021—Landscape Design, Implementation, and Management II (4 cr)

NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)

NRES 3101—Conservation of Plant Biodiversity (3 cr)

NRES 4395—Natural Resource Planning (3 cr)

PA 4200—Introduction to Urban and Regional Planning (3 cr)

General Education

Rhet 3562W—Technical and Professional Writing (4 cr)

The following courses are recommended (not required) to fulfill the two 3xxx-5xxx course requirement at (6-8 cr) in the physical and biological sciences.

AgET 4223—Hydrology and Water Quality (3 cr)

EEB 4002—Ecology of Minnesota (2 cr)

EEB 4014—Ecology of Vegetation (3 cr)

EEB 4016—Ecological Biogeography (3 cr)

EEB 4601—Limnology (3 cr)

EEB 4609—Ecosystem Ecology (3 cr)

FR 4114—Forest Hydrology and Watershed Management (3 cr)

FR 5104—Forest Ecology (4 cr)

FR 5153—Forest and Wetland Hydrology (3 cr)

Geo 4701—Geomorphology (4 cr)

Geo 4703—Glacial Geology (4 cr)

Geo 5108—Principles of Environmental Geology (3 cr)

Geog 5441—Quaternary Landscape Evolution (3 cr)

Hort 5071—Restoration and Reclamation Ecology (3 cr)

NRES 3061W—Water Quality: Management of a Natural Resource (3 cr)

NRES 3575—Wetlands Conservation (3 cr)

PBio 4321—Taxonomy of Minnesota Flora (3 cr)

III. Open Electives

At least 33 credits are required in open elective courses from any program, at any level.

Accelerated Status in Environmental Design

Applications for the accelerated status option in the B.E.D. program must be submitted by January 15 of the year of desired entry. Admission is for fall only. The following policies and admission procedures change periodically; students should check with their adviser and the Department of Landscape Architecture for current information.

- Apply to the University of Minnesota if not already a student.
- Complete the first three years of the B.E.D. coursework.

CALA's mentor program matches students with professionals in their field of study.

- Complete the accelerated status option application available from the Department of Landscape Architecture (612-625-6860).
- Submit official transcripts of all coursework at the college, university, or graduate level, including coursework currently being taken. Typically, a student must have a GPA of at least 3.00 for admittance.
- Submit a letter of intent describing the student's interests, strengths, skills, and experiences related to landscape architecture; landscape architecture and the interests, strengths, and skills needed to practice it as understood by the applicant; and why there is a good fit between the applicant's interests, strengths, skills, and experiences and landscape architecture (maximum of two pages).
- Submit a portfolio of art or design work, environmental or design reports, photographs of three-dimensional work, slides, or similar examples of creative work. *The work should convey the applicant's creative abilities and communication skills.* It is strongly suggested that the portfolio be a bound 8 1/2 x 11-inch booklet. Portfolios larger than 24 x 36 inches will not be accepted. Loose materials are also unacceptable. Slides must be submitted in 8 1/2 x 11-inch transparent slide carrier pages.

The landscape architecture faculty votes on each applicant. The applicant may be admitted to the accelerated status option or continued in the B.E.D. program. It is assumed that students who are accepted will complete their B.E.D. program in the accelerated status option track and apply to the M.L.A. program. Admission is based on the

- student's academic standing and GPA
- student's understanding of landscape architecture
- fit between the student's interests, strengths, skills, and experiences and landscape architecture
- student's potential to succeed as a practicing landscape architect as estimated by the faculty
- resource and space availability

Applicants are encouraged to visit the landscape design studios, talk to students who are in the accelerated option track and the M.L.A. program, and find out as much as they can about the profession by talking with landscape architects in their community.

Applicants will be notified of the admission decision by May 15. Successful applicants must notify the department of their intention to enter by June 15 to reserve a position in the program.

During their senior year, students in the accelerated program enroll in the following courses:

First Semester (14 cr)

LA 5201—Making Landscape Spaces and Types (6 cr)
LA 5133—Lake Itasca Landscape Analysis (1 cr)
LA 5371—Computer Methods I (1 cr)
LA 5571—Landscape Construction: Landform Systems and Spatial Performance (3 cr)
Elective course (3 cr)

Second Semester (13 cr)

LA 5203—Ecological Dimensions of Space Making (6 cr)
LA 5204—Landscape Ecology (3 cr)
LA 5372—Computer Methods II (1 cr)
Elective (3 cr)

Environmental Design Minor

Students pursuing a minor must complete at least 21 credits. Two courses are required; the remainder are chosen from a list of optional courses. A maximum of 9 transfer credits may be used for the minor and a maximum of three courses taken for a major degree may also be used toward the minor.

A minimum grade of C- is required in all courses taken for the minor.

Required Courses (6 cr)

LA 1401—The Designed Environment (3 cr)
LA 3413—Introduction to Landscape Architectural History (3 cr)

Optional Courses (15 cr)

Arch 3301—Drawing for Design in Architecture (3 cr)
Arch 3401W—Environmental Design and the Sociocultural Context (3 cr)
Hort 1012—Woody Landscape Plants (3 cr)
LA 1101W—Introduction to Design Thinking (4 cr)
LA 1301—Introduction to Drawing in Architecture and Landscape Architecture (3 cr)
LA 3001—Introduction to Landscape Architectural Design (3 cr)
LA 3501—Environmental Design and its Biological and Physical Context (3 cr)
LA 3204—Landscape Ecology (3 cr)
LA 5571—Landscape Construction: Landform Systems and Spatial Performance (3 cr)
LA 5573—Landscape Technology: Introduction to Geographic Information Systems (3 cr)
LA 8302—Professional Practice (3 cr)

Design Minor

Interdisciplinary

Minor Only

The design minor is open to students who are not majoring in a design field. To complete the minor, students must have approval of both their major program adviser and the design minor adviser. Students must complete at least 14 credits. To ensure an interdisciplinary perspective, students must earn at least six of their design minor credits outside their home department, and may count only one course for both their major and the design minor.

For more information contact the design minor adviser in the Office of CALA Student Services at 612-626-1000.

Required Courses

DHA/LA 1101W—Introduction to Design Thinking (4 cr)
DHA 4001—Design Minor Seminar (1 cr)
Arch 3611—Design in the Digital Age (3 cr)
or Kin 3501—Human Centered Design (3 cr)
Two additional supporting courses
One studio, lab or other design experience course from list of approved courses*
One additional upper division course from list of approved courses*

**Approved course lists are available in the Office of CALA Student Services, 107 Architecture, or on the Web at <http://design.umn.edu>.*

College of
Biological Sciences

This is the College of Biological Sciences section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Degree Programs and Minors


Kodak

College of Biological Sciences

General Information

The mission of the College of Biological Sciences (CBS) is to provide outstanding educational opportunities to undergraduate and advanced students and carry out world-class research in areas of modern biology from the molecular to the ecosystem level. To accomplish this mission, it is necessary to integrate a strong basic research program with both traditional and innovative classroom teaching and with intensive mentoring of students at all levels.

As part of its mission, the college is dedicated to providing basic biological science education and sharing expertise with students and colleagues in other disciplines at the University of Minnesota, such as agriculture, natural resources, engineering, health sciences, and liberal arts.

The college is committed to outreach to the general community and cooperation with other educational institutions. College members actively participate in the scientific community and in the leadership of professional organizations, and they contribute to the administration and governance of the University.

Research and Teaching Facilities

CBS has faculty and facilities on both Minneapolis and St. Paul campuses. The college is organized into the following departments: Biochemistry, Molecular Biology, and Biophysics; Ecology, Evolution, and Behavior; Genetics, Cell Biology, and Development; and Plant Biology. The Department of Microbiology and the Department of Neuroscience, both of which are housed in the Medical School, also function as CBS departments for undergraduate education. A description of departments and their major degree requirements may be found beginning on page 80.

In addition, CBS is responsible for the administration of several instructional programs, research institutes, shared-use laboratories, and an active field biology program with facilities at several locations around the state (see below). A complete list of faculty is provided in the Faculty and Administration section of this catalog.

Albert Frenkel Reading Room—The Reading Room, 406 Biological Sciences Center on the St. Paul campus, is open to all CBS students, faculty, and staff. It houses a small collection of journals and books on a range of biology topics, research ethics, and teaching and learning techniques and accepts donations of recent biology publications (612-624-7752).

Biological Sciences Greenhouse—On the St. Paul campus, the greenhouse is a teaching and research facility with standard bench space. Four landscaped rooms exhibit the flora of the tropics, subtropics, desert and aquatic regions (612-625-4788).

Lake Itasca Forestry and Biological Station—Situated at the headwaters of the Mississippi River in northern Minnesota, the field station is in an unparalleled ecological area where three great plant regions of the United States meet. These 50 square miles of protected forest provide unique opportunities for the study of varied ecosystems and of fauna and flora with southern, northern, and western origins. Diverse lakes and wetlands provide unusual field advantages for aquatic studies. Information about the highly popular summer biology offerings is in the *Summer Term Catalog* and at <www.cbs.umn.edu/itasca>. Reservations for and questions about the Itasca program should be addressed to the Itasca Biology Program, University of Minnesota, 220 Biological Sciences Center, 1445 Gortner Avenue, St. Paul MN 55108 (612-624-6743).

Cedar Creek Natural History Area—Within commuting distance of campus, Cedar Creek not only serves as the site of ecological and behavioral field research, but also provides unique opportunities for student projects and summer employment. For student opportunities, contact the Office of Student Services (612-624-9717) or the Cedar Creek Natural History Area program director (612-625-5743), or see the Web site at <www.lter.umn.edu/>.

General Biology Program—Located in 3-140 Molecular Cellular Biology on the Minneapolis campus, this program administers beginning biology courses for most University students, serving approximately 4,000 students per year. Students meet CBS's finest instructors in these courses and enjoy personal attention in laboratory sections. For more than a decade, the program has premiered the use of digital technology in undergraduate education. Visit the Web site at <http://genbiol.cbs.umn.edu> for more information or call 612-625-6636.

Instructional Computing Centers—Biology students have access to a well-equipped Macintosh plus Windows computing facility in 406 Biological Sciences Center, a Windows facility in 170 Ecology Building, and also in 2-124 Molecular and Cellular Biology Building. Another facility will be available on the Minneapolis Campus beginning fall, 2002. Priority in the computer centers is given to undergraduate classes and undergraduate students working on course-related materials. Students can use programs for word processing, graphing, drawing, or spreadsheets and can access many electronic databases and file servers around the world, as well as their own electronic mail service. Hours for each computing lab are posted on the lab doors.

CBS Computing Services—CBS Computing Services offers user support and serves more than 110 labs with advanced nucleic acid and peptide sequence analysis software. Molecular graphics facilities permit specialized research on the structure and function of DNA, RNA, and proteins (612-625-9284).

Developmental Biology Center—The University has launched a major initiative in developmental biology, with researchers representing both basic and clinical sciences. Developmental biology identifies mechanisms whereby a single cell, the fertilized egg, develops into a complex multicellular organism containing millions of cells organized into characteristic patterns, with many different specialized functions. Developmental biology has become a central subject in biology and is of both medical and economic importance. The center serves as a resource for collaborative research and training (612-625-9429).

Institute of Human Genetics—The institute's major objective is to develop an interdisciplinary approach to studying and applying new developments in human genetics. Research by its members is directed at understanding how genetics contributes to human biology. This institute's programs include gene therapy, and molecular, neurobehavioral, clinical, and population genetics, as well as genetic counseling. For more information, call 624-8411 or visit the Web site at <www.ihg.med.umn.edu>.

Jane Goodall Institute's Center for Primate Studies—This branch of the Jane Goodall Institute studies chimp behavior and houses all 38 years' worth of Goodall's records from Tanzania's Gombe National Park. For more information, call 624-6714 or visit the Web site at <http://biosci.cbs.umn.edu/chimp/>.

Plant Molecular Genetics Institute—The institute fosters research in molecular biology and genetics of economically important plants and relevant model plant systems, develops genetic engineering methodologies for application to crop improvement, educates future plant biology researchers and teachers, maintains an interdisciplinary environment in which to explore and develop new ideas and experimental approaches in plant molecular biology, and provides a focus for external communication to aid recruitment and funding. Institute faculty members come from two colleges (Biological Sciences and Agricultural, Food and Environmental Sciences) and six departments (agronomy and plant genetics; biochemistry, molecular biology and biophysics; genetics, cell biology and development; horticultural science; plant biology; and plant pathology). The institute supports seminars and symposia on topics related to plant molecular biology and provides funds for speakers and visiting scientists (612-625-4718).

BioTechnology Institute BTI—The institute, established in 1985, brings together faculty from the College of Biological Sciences, the Institute of Technology, and the Medical School, for an interdisciplinary approach to biotechnology research in areas such as biocatalysis, biodegradation of hazardous waste, molecular evolution of proteins, and cell population biology. BTI also operates the Biotechnology Resource Center, a University-wide, shared-use facility that provides state-of-the-art equipment and expert staff for fermentation, animal cell cultures, expression of recombinant proteins, and large-scale separation of biological molecules. BTI promotes collaboration between University researchers and industry and is working to meet the increasing demand for students trained jointly in biological and engineering disciplines. For more information, call 612-624-6774 or visit the Web site at <http://cbs.umn.edu/bpti>.

BIODALE—Biodale is a consortium of University of Minnesota service centers offering state-of-the-art instrumentation and user-friendly, walk-in service and training. Biodale is located in the lower levels of Snyder Hall and Gortner Laboratory on the St. Paul campus. Biodale's research services cover the following:

The Advanced Genetic Analysis Center—The center provides automated DNA sequence analysis, sequence data management, Genescan fragment analysis, oligonucleotide synthesis RNA analysis, and MicroArray spotting and scanning. For more information, call 612-625-7736 or see the Web site at <www1.umn.edu/agac>.

Bioinformatics and Research Computing Facility—Bioinformatics is the science of analysis and comparison of genetic sequence and genome information. The high-speed networks available at this facility help users analyze what they have sequenced. For more information, call 612-626-0495 or visit the Web site at <www.cbs.umn.edu/rcf>.

Mass Spectrometry Consortium for the Life Sciences—In addition to the traditional areas of organic mass spectrometry, the facility has added state-of-the-art instruments with MALDI and electrospray ionization on ion-trap, time-of-flight and hybrid mass spectrometers. The emphasis is on the study of molecules of biological origin, particularly in the emerging field of proteomics. The facility is available to all University biologists as well as outside researchers. For more information, call 612-624-7715 or visit the Web site at <www.cbs.umn.edu/mass_spec>.

High-Throughput Screening and Analysis Facility—In this facility, robots shuffle genes to find which of the thousands of recombinations produces the desired organisms. Several instruments are interfaced by a robot allowing high-throughput handling and analysis of thousands of samples per day. For more information, call 612-625-5782.

Imaging Center—A state-of-the-art facility for imaging of primarily biological specimens using light and electron optical methods with expertise centered on live cell imaging. Advanced digital imaging and analysis equipment is available for use. For more information, call 612-624-3454 or visit the Web site at <www.cbs.umn.edu/ic>.

Protein Expression and Purification Laboratory—This facility provides expertise in expression of proteins for structural, immunologic, and biochemical experiments. For more information, call 612-624-7246 or visit the Web site at <www.cbs.umn.edu/bpti/RPEL.html>.

Fermentation Process Development and Scale-up Laboratory—This facility offers process development, scale-up, and downstream processing for all types of fermentations allowing users to scale up microbial growth to industrial levels. For more information, call 612-624-6758 or visit the Web site at <www.biosci.cbs.umn.edu/bpti/brc>

Beginning College in Biological Sciences

If you're about to begin college and think biology may be your area of interest, there are some important questions you need to consider. (If you've already completed one or two years of college work and are thinking of transferring to the University of Minnesota, see Transfer Admission in the General Information section of this catalog.)

How do I know if biology is a good choice for me?

Some students have always had an interest in biology. Others didn't become hooked until they were inspired by a special teacher or course in high school. Some see biology as a step toward a career in medicine or preserving the environment. Yet others think they may have a strong interest, but want to learn more. If you fall into one of these categories and have a strong high school background in science and math, then read on.

Is biology a good choice right now? Do biology careers look promising for the future?

Biology is playing an increasingly important role in health, agriculture, the environment, the economy, and society in general, thanks to advances such as the sequencing of the human genome and development of new biotechnologies. New career opportunities in the biotechnology industry, government, and education are emerging all the time. There has never been a better time to earn a degree in biology.

The University of Minnesota is a research university. What does this mean for undergraduates?

It means that many faculty are engaged in federally sponsored research, which gives undergraduates a multitude of opportunities to gain research experience working with faculty in laboratories.

Do all students have the opportunity to be involved in research?

Most students participate in research, choosing from opportunities in basic sciences, medicine, dentistry, pharmacy, veterinary medicine, agriculture, and natural resources. Hands-on experience in a laboratory or in the field is an essential part of the educational experience in CBS. Research experiences help students gain admission to competitive graduate programs, and many employers require candidates to have research or internship experience.

The University has a College of Biological Sciences rather than just a department. What does this mean for students?

As a college, CBS has a much larger faculty, more varied course offerings, and more services for biology students. Services include an honors program; research, internship and study abroad opportunities; and a Career Center.

What if I'm not sure I want to major in biology? If I choose CBS now, will I have problems if I change my major later?

No. All lower division students take general education courses, including biology. If you change your major later, you will not be at a disadvantage when you transfer to another college. But if you are undecided and considering several options, the College of Liberal Arts is a good place to explore a variety of interests.

Admission

Students may enter CBS at the beginning of their freshman, sophomore, junior, or senior year. For those students who choose to begin at another institution or even in a different college at the University, transfer into CBS is welcome at any point in the undergraduate program. CBS faculty and staff can help students select appropriate coursework for transferring to the college. During the freshman and sophomore years, students should plan to complete, at least, the beginning English composition course, mathematics, general chemistry, and general biology. Most students take organic chemistry during their sophomore year, thereby allowing ample time for major coursework and research experience.

Requirements

Freshmen Admission Requirements

For official and up-to-date information about the University's admissions policies, procedures, and deadlines, please see the latest edition of the *Undergraduate Application Booklet* available from the Office of Admissions or online at <http://admissions.tc.umn.edu>.

Admission requirements for students transferring from other University of Minnesota colleges:

1. A 2.00 GPA and grades of at least C- in the following:
   a. General biology (Biol 1009 or 1001)
   b. General chemistry (Chem 1021 and 1022)
   c. Calculus (Math 1271 and 1272 or 1281 and 1282)
2. Courses must be complete at the time of application, with the following exception: students with a GPA of 3.00 or higher may be admitted with one course in progress.

Admission requirements for transfer students with other previous college experience

Students applying for admission to CBS with previous college experience elsewhere must have the following:

- Minimum GPA of 2.50 in previous college coursework
- At least C- in General Biology 1009 or 1001 or equivalent; General Chemistry 1021 or equivalent; and Calculus 1271 or 1281 or equivalent
- Evidence of consistent academic success in other college coursework

Courses must be complete at the time of application, with the following exception: students with a GPA of 3.00 or higher may be admitted with one course in progress.

For more information on transfer course equivalencies, visit <http://admissions.tc.umn.edu/inside/transfercredit_03.html>. For course equivalencies in chemistry, math, and physics, go to <http://www.it.umn.edu/admissions/equiv/index.html>.

Applications to the University of Minnesota, Twin Cities may be requested from the Office of Admissions (612-625-2008 or, toll free in the United States, 1-800-752-1000).

For more information, contact the Office of Student Services (612-624-9717).

CBS graduates go on to careers in biotechnology, health sciences, environmental planning, law, research and education, and government.

Orientation

Before classes begin, freshmen and transfer students are invited to attend a New Student Program/Orientation. The program acquaints students with the campus and provides information about CBS and the University. Students spend part of the session with an adviser who helps them plan their undergraduate program. Participation in orientation is required.

Freshmen attend a series of programs and seminars throughout the first year to fully acquaint them with CBS faculty, staff, and students and inform them about special opportunities for biology students.

Transfer students also attend a CBS orientation/reception during the first week of the semester. Information is presented about research and internship opportunities, as well as information critical to preparing for a profession in the biological sciences.

Undergraduate Programs

Students choose CBS because it has high quality programs offered by professors who are recognized in their fields. As students begin planning for a specific career, they should supplement their coursework with research experiences and internships to further develop their skills and prepare for their chosen professions. Students may explore biology career interests through the Biology Colloquium, freshman seminars, a broad selection of course offerings, and special programs offered through the CBS Career Center, including Biol 2001—Careers in Biology.

The CBS bachelor of science degree program is composed of four essential elements. Each is important in preparing students to be leaders in their chosen professions in an increasingly complex and interdisciplinary world.

I. Liberal Education—A liberal education gives students a broad perspective that strengthens judgment and critical thinking skills. It enables students to seek:

- communication and critical thinking skills;
- understanding of the ways scientists contribute to knowledge;
- historical and philosophical perspective on the nature of students' own lives and the world in which they live;
- and appreciation of the creative insights into life and nature provided by literature and the arts.

To help achieve these goals, the University requires all students to distribute a portion of their coursework in areas of study outside of those most directly linked to their specialized interests in science.

II. Physical Sciences and Mathematics—The biological sciences rely heavily on the tools of mathematics and physical science. Organisms consist of molecules that obey the rules of physics and chemistry; these rules are often stated using mathematics. Modern biologists in the field and in the laboratory must be able to use fundamental principles of mathematics, chemistry, and physics to appreciate living organisms at all levels from molecules to ecosystems.

Mathematics is a tool that underlies all of science. It permits the description of the kinetics of reactions occurring in organisms, is used to model population growth and distribution, and forms a basis for statistical analysis of data.

Chemistry is the study of molecules and their interactions. Phenomena such as nerve impulses, the exchange of gases in respiration, water balance, and the conversion of food energy to useful work by organisms require an understanding of chemistry. Organisms are composed of organic molecules. An understanding of these molecules and their reactive groups is essential to an understanding of biological phenomena such as metabolism, gene function, and nutrient cycling in ecosystems.

Physics includes the study of atoms and their interactions, mechanics, heat, sound, electricity and magnetism, and the properties of light. The laws of physics are important for our understanding of photosynthesis, blood and air flow, mutations, and energy pyramids in ecosystems. Also, the instruments and techniques used by biologists require a basic understanding of physics.

III. Biology Core Curriculum—Specialists will always be important in biology, but today there is a growing need for people whose understanding ranges across the disciplines of biology. Students are introduced to diverse aspects of biology by completing a set of core courses. Some courses introduce students to various kinds of organisms—animals, plants, and microorganisms. Biochemistry introduces students to organic compounds of importance to organisms, to enzyme-catalyzed reactions, and to metabolic pathways involved in the synthesis or catabolism of macromolecules.Cell biology provides an in depth analysis of cellular structure and function. Genetics examines the mechanisms of heredity, including both molecular genetics and population genetics. Ecology, evolution, and behavior introduces students to populations, evolution, and the behavior of animals.

IV. Specialization in the Major—Students may choose to major in biology, which offers a variety of electives, or a departmental major (biochemistry; ecology, evolution, and behavior; genetics, cell biology and development; microbiology; neuroscience; plant biology; or the new interdisciplinary biology, society, and environment). These majors each have required courses specified by the department. In addition, most students will plan to complete a research project in their area of interest. Each department offers credit for Directed Study (4993 and 4793W) and Directed Research (4994 and 4794W).

Recommended Related Coursework

The University offers a variety of life sciences courses in addition to those offered by CBS. These elective courses may be found in a number of areas, including agronomy and plant genetics (Agro), animal science (AnSc), anthropology (Anth), biophysics (BPhy), chemical engineering (ChEn), chemistry (Chem), computer science (CSci), entomology (Ent), fisheries and wildlife (FW), food science and nutrition (FScN), forest resources (FR), geology (Geo), history of medicine and science (HMed, HSci), horticultural science (Hort), laboratory medicine (LaMP), mathematics (Math), natural resources and environmental studies (NRES), pharmacology (Phcl), philosophy (Phil), physics (Phys), physiology (Phsl), plant pathology (PlPa), psychology (Psy), public health (PubH), soil science (Soil), statistics (Stat), veterinary biology (VB), and veterinary pathobiology (VPB).

Graduate Programs

Graduate study at the University is coordinated and administered by the Graduate School. For information about general policies regarding admission requirements, registration procedures, financial aid, and requirements for graduate degrees, see the *Graduate School Catalog*. Application materials may be obtained from CBS department offices.

Questions regarding specific bioscience programs should be addressed to the director of graduate studies in the appropriate program area.

(area code 612)

Biochemistry, Molecular Biology, and Biophysics—Anath Das, 624-3239, and Michel Sanders, 624-9637

Conservation Biology—Francesca Cuthbert, 624-1756

Ecology, Evolution, and Behavior—Donald N. Alstad, 624-6748

Genetic Counseling—Bonnie LeRoy, 624-7193

Microbial Engineering—Michael Sadowsky, 625-1722

Microbiology, Immunology, and Cancer Biology—Christopher Pennell, 625-0453

Molecular, Cellular, Developmental Biology, and Genetics—Margaret Titus, 625-8498

Neuroscience—John Soechting, 625-7961

Plant Biological Sciences—David Somers, 625-5769

Honors Program

The goal of the honors program is to provide a special learning community of motivated students and faculty. The CBS honors program consists of two parts. The freshman-sophomore program offers honors courses, a CBS honors colloquium and co-curricular activities that allow students to interact with faculty and explore various research frontiers. Students who complete the freshman-sophomore part of the program earn a sophomore honors certificate and a special notation on their transcript. Students who maintain a strong academic record in their first two years of college may participate in the second part of the honors program. The nucleus of the junior-senior honors program is a directed research experience. Students also participate in the CBS honors seminar, which provides exposure to the breadth of biological inquiry and promotes interactions among the honors students. The honors experience culminates in a written thesis and a research presentation at the Life Sciences Undergraduate Research Symposium. Students who complete the junior-senior part of the honors program graduate with a "Latin" (e.g. *cum laude*) honors degree.

Honors Program Admission—Entering freshmen apply to the honors program when they apply to the University by completing the *Application for Scholarships and Honors Programs*. Forms are available in the Admissions Office, and online at <http://admissions.tc.umn.edu>. For entering freshmen, admission to the honors program is based on achievements in high school, standardized test scores, and an essay.

Admission to the second stage of the honors program is based on grades earned during the first two years of college. Students are encouraged to apply soon after they have completed 60 credits, and must be registered for a minimum of two semesters after being accepted into the program to fulfill the requirements for graduation with honors (see below). Applicants should have a 3.50 minimum GPA. Admission to the freshman-sophomore honors program is not a prerequisite for admission into the junior-senior honors program. Application forms are available in 223 Snyder Hall.

Sophomore Honors Certificate—To earn a certificate and transcript notation signifying completion of the freshman-sophomore honors program, students must satisfy the following requirements within the first two years at the University of Minnesota:

1. One freshman seminar during the first year
2. Biol 2960H—Honors Colloquium: Explorations in the Biological Sciences during the second year
3. Two additional honors courses
4. Maintain a minimum GPA of 3.50.

Directed Research—This provides students with research experience to obtain new information about the biological system under investigation. Honors program participants should select a research adviser from the college faculty and start on a project early in their junior year or as soon thereafter as possible. Participation in at least two semesters (6 credits) of directed research is required; students may register in BioC 4794W/4994, EEB 4794W/4994, GCD 4794W/4994, MicB 4794W/4994, NSc 4794W/4994, or PBio 4794W/4994. Students who participated in the Undergraduate Life Sciences Summer Research Program or who received Undergraduate Research Opportunities Program grants may petition to use this work to fulfill up to three of the six research credits. An honors thesis, summarizing the research and written in the style of a publishable manuscript, is required. The thesis must be approved by the faculty member supervising the research and by two other faculty (at least one of whom must be from CBS), chosen with college approval.

Honors Seminar—Honors program graduates must participate in two semesters of Biol 3960—Honors Seminar. In fall semester, the seminar is a forum to discuss special topics focused on a theme of general relevance to all biologists. In spring semester, seniors nearing completion of their directed research projects must present summaries of their project results. Students must take a seminar in the fall and follow that with a seminar in the spring semester preceding graduation. They also are encouraged to enroll in the spring semester seminar before the senior year.

Graduation With Honors—Participation in the honors program is required for graduation with the traditional honors designations *cum laude, magna cum laude,* and *summa cum laude.* In addition to the requirements for graduation, candidates for graduation with honors must complete

1. at least 40 credits in upper division courses (3xxx-5xxx) at the University of Minnesota, Twin Cities, including two semesters of honors registration.
2. two semesters (6 credits) of directed research, the results of which are to be reported in an acceptable honors thesis.
3. two CBS honors seminars (Biol 3960H), one of which must be completed during fall semester and the other during the last spring semester in residence.
4. one additional honors opportunity, which may be selected from
   a. an additional semester (2 credits) of participation in directed research.
   b. an upper division honors seminar offered by the CLA Honors Division.
   c. an upper division honors course (3xxx-5xxx).
   d. an 8xxx course (seniors only; requires permission).
5. the last 60 credits of A-F registration with the minimum GPAs specified below:

   cum laude: 3.50 minimum GPA
   magna cum laude: 3.66 minimum GPA
   summa cum laude: 3.75 minimum GPA

Grades of F and N, which carry no grade points, are included in the computation of the CBS honors GPA. If a portion of the last 60 credits completed has been transferred from another institution, the proportion of residence credits with grades of A must at least equal the proportion of transfer credits with grades of A.

For More Information—Once admitted, students should feel free to discuss questions with an Office of Student Services adviser or honors program staff in 223 Snyder Hall.

CBS students have access to an exciting array of experiential learning opportunities. The internship and research databases in the CBS Career Center (213 Snyder Hall) are great places to begin exploring these opportunities.

Graduation Requirements

To earn a B.S. degree from CBS, students must complete at least 120 credits with grades of A, B, C, or S. Grades of D or D+ are not accepted in any of the math, chemistry, physics or biological sciences courses used to meet requirements for the major.

Course Requirements

English Communication Skills—See Writing Requirement under Liberal Education Requirements on page 31 of this catalog.

Foreign Language—Either two high school years or one college year of study of a single foreign language or demonstration of equivalent proficiency satisfactory to the appropriate language department.

Liberal Education—The University's liberal education diversified core, designated themes, and writing skills curriculum is required for all students completing a degree program on the Twin Cities campus. (See page 31 of this catalog.)

Mathematics and science coursework required of CBS students ordinarily satisfies the minimum University requirements for physical and biological sciences and mathematical thinking.

Physical Sciences and Mathematics—CBS majors require at least one year of calculus, one year of physics, and chemistry through organic chemistry. See specific requirements included with the description of each major beginning on page 80.

Biological Sciences—Each major has a defined list of required courses in general and organismal biology, and components of the biology core curriculum. Requirements are listed with each major beginning on page 80.

Advising

The size and diversity of the University offers unlimited opportunities for students to explore and develop their academic, professional, and personal interests.

Both current and prospective students are well-served by the advising services, resources, and programs provided by CBS's faculty and Office of Student Services. CBS students are assigned to a faculty adviser in their particular area of interest. In addition, Office of Student Services staff members are available by appointment for students to discuss student concerns. Summarized below are the types of advising services available through a combination of faculty and professional advising.

The Office of Student Services performs a variety of other essential functions in the college, including admission, student orientation and registration, academic progress review, and degree certification.

Prospective Student Activities

Admission counseling
Career transitions
Prospective student information
High school and community college visits
College tours
Summer science program
Visit days
Welcome fair

New Student Advising

Orientation
New student reception
Course planning
Freshman seminars and special events
Exploration of life sciences majors
Campus resource information

Developmental Advising

Intellectual and personal growth
Career directions
Goal setting
Clarifying values
Decision making
Refining skills
Developing leadership

Peer Advising/Networking

Honors
Biology Colloquium
Biological Sciences Student Association
CBS club activities
Alumni society
Mentor programs
Biology House

Major and Faculty Advising

Program planning
Career exploration/planning
Internship Program
Undergraduate research
Seminars
Preparation for graduate and professional school programs

Program Planning—This annual, shared planning activity should form the basis of an ongoing relationship between the faculty adviser and student. The importance of the relationship between faculty adviser and student cannot be overemphasized. Students will find it useful to consult their advisers to discuss progress in specific courses, obtain information about graduate study, plan internships, or arrange to work with faculty in laboratory and field settings.

Special Learning Opportunities and Resources

Students are encouraged to explore the full scope of learning experiences available, including those beyond the required curriculum. Many students plan projects they carry out under faculty supervision in research laboratories and in the field. Some students participate in off-campus internships in private industry, government agencies, and the nonprofit sector. Other students seek employment as undergraduate teaching and research assistants or museum tour guides. Most departments offer special seminars for undergraduates.

Biology Colloquium (Biol 1020)—This unique course, organized and run by students, is recommended for those who wish to explore the various fields and career alternatives in the biological sciences. Offered each semester, the course gives students the chance to interact with biology faculty and students with similar interests. The colloquium offers both large group seminars, featuring prominent scientists discussing their research programs, and small group tours to research facilities on and off campus, such as the Raptor Rehabilitation Center, the Wolf Center, or behind-the-scenes at the Minnesota Zoo. In addition, students are encouraged to begin exploring their own interests through participation in a research project. Colloquium student leaders help students find projects that fit their interests and allow them to earn University credit.

Socially, colloquium students always find time for fun, whether on a field trip or studying together in the colloquium student room. A popular social event is the weekend field trip to the Itasca Biological Station near the headwaters of the Mississippi. Upper division biology majors gain important leadership and communication experience as colloquium leaders.

Freshman Seminars—These are small classes, taught by the University's finest faculty. Students explore exciting ideas and concepts and also learn more about the University and the wide range of services available.

Multicultural Affairs—CBS seeks to increase the number of students of color who enroll in and successfully complete its courses and majors. The college provides students of color with mathematics and science tutors, faculty mentors, and research experiences. The coordinator for recruitment and retention is available to work with individuals or groups of students to explore potential interests in biology, provide academic assistance, identify employment opportunities and alternative sources of financial aid, assist in leadership development, and help overcome barriers to educational success. For more information, contact John S. Anderson, 123 Snyder Hall (612-625-8752).

Internship Program—Offered by the CBS Career Center, the Internship Program provides experiential education information and opportunities to students year-round, specializing in biology-related internships, community service opportunities, and study-travel internships. Experiential learning programs promote academic and professional competence, skills development, career exploration, personal growth, and social responsibility through student involvement in structured work situations. CBS promotes excellence among University students by helping them integrate their classroom study with practical learning experience in the academic, public, and private sectors. Participating in the internship program allows students interested in biology to begin career exploration and planning early in their academic careers.

Previous students have studied marine biology at marine institutes and local facilities, gained laboratory experience in private industry, learned forensic science techniques in a criminal identification lab, and studied health care policy in Kenya, to name a few projects. Organizations sponsoring internship opportunities include educational institutions, government agencies, businesses, and nonprofit organizations. Both paid and volunteer positions are available throughout the year and some offer course credit. The CBS Alumni Society provides stipends each year for students who participate in unpaid internships. Students with specific interests may design their own internship and Career Center staff will help them find a sponsoring organization. Students can earn credit for a structured professional learning experience through registration in Biol 3610—Internship: Professional Experience in Biological Sciences

Undergraduate Research—Each spring an Undergraduate Research Symposium is held to recognize the accomplishments of undergraduates participating in life sciences research projects. Students do research work largely on their own and at their own pace, supervised by a University faculty or staff member.

Students may choose to earn academic credit for their research experiences, or they may wish to apply for special grants that provide a research stipend. CBS students are able to apply for financial support for their research activities through the University's Undergraduate Research Opportunities Program (See Undergraduate Research in the General Information section of this catalog). The CBS Career Center maintains a research topic database to help students find interesting research projects in laboratories throughout the University.

Scholarships

Students are encouraged to apply for both need- and merit-based CBS scholarships. Information and scholarship applications are available at <http://cbs.umn.edu/honors> or by calling Student Services at 612-624-9717.

International Programs

CBS students recognize the need to prepare themselves to be citizens of a multicultural society, a global economy, and an increasingly interdependent world. The college encourages them to enhance their education by taking advantage of international programs sponsored by the University.

The college also encourages study abroad for language acquisition or culture learning. The resulting credits can be used as general electives or, in some cases, to satisfy liberal education requirements. The University sponsors or cosponsors a broad range of intensive short-term language programs and area studies programs.

The two types of study abroad that best lend themselves to study in the biological sciences are field study and integrated classroom study.

For more information, see Study Abroad in the General Information section of this catalog.

Career Information

Biology encompasses many fields of study and appeals to students with diverse interests. Career opportunities are equally broad. While students might be drawn to some majors because of their direct application to jobs, most students select a major in the biological sciences because it is the subject they most enjoy learning about. Happily, they will discover that their career choices are limited only by their imagination, individual interests, and acquired skills.

Many students study biology to prepare for professional training in the health sciences. Because entry requirements for the health sciences generally include similar courses to those required in CBS (mathematics, chemistry, physics, and biology), a bioscience major provides a good foundation for these fields of study. In fact, nearly a third of CBS graduates each year choose to continue their education in health fields including medicine, dentistry, pharmacy, veterinary medicine, and public health.

CBS students beginning full-time employment immediately following graduation frequently take research scientist and laboratory technician positions. Others pursue an array of occupations requiring a liberal education and bachelor's degree, from business fields (e.g., sales, quality control, communications) to public service (e.g., environmental control or regulatory affairs, public education). CBS graduates have been very successful in gaining employment in their chosen professional fields, even at times when the market was limited and competitive. Right now, given the importance of biology in so many aspects of U.S. society and economy, the market for CBS graduates is very strong. Biologists are clearly in demand as advances in biotechnology create opportunities in health care, environmental science, and teaching the next generation of biologists. Employers have come to realize that the University is a good place to find well-trained biologists.

CBS houses the Jane Goodall Institute for Primate Behavior, a National Science Foundation Long-term Ecological Research Site at Cedar Creek National History Area, and the Biotechnology Institute.

Some students combine their training in the biological sciences with other fields, such as engineering, graphic arts, law, business, or computer technology. Those graduates who choose to continue their study are regularly admitted to high-quality or highly ranked graduate schools and professional programs.

Nearly half of CBS graduates elect to pursue advanced study immediately after earning the B.S. degree (about 20 percent are admitted to professional schools and 20 percent enter graduate programs); the percentage of each graduating class that pursues advanced training had increased over time. Details about follow-up studies of graduates are available on request in 223 Snyder Hall.

Career Center—The CBS Career Center helps students explore the varied career options available to CBS graduates. Undergraduates are encouraged to consult with Career Center staff early to investigate careers, learn about career preparation, and begin to make decisions. The center provides extensive career and employer information, and connections to professionals in many fields of interest. Contacts made through the Internship Program, annual Career and Internship Fair, and CBS Career Network ensure that students make well-informed career decisions. Career Center staff also offer an annual course, Biol 2001—Careers in Biology, to help students in their career choices.

As graduation approaches, the center assists students in applying to graduate schools and professional health sciences programs. For those choosing to enter the job market directly, the center helps develop job search skills (including résumé writing and interviewing) and provides placement assistance in the form of job listings and a résumé distribution service. For more information, visit the center's Web site at <www.cbs.umn.edu/career>.

Students interested in teaching biology at the secondary level should consult the College of Education and Human Development for information about the curriculum.

Student Organizations

Achieving Excellence in Mathematics and Science (AEIMS)—All life sciences majors are encouraged to participate in AEIMS with students from other sciences, mathematics, and engineering. The club was established to ensure full participation of students from groups currently underrepresented in science and to foster interaction among diverse life sciences students and faculty. AEIMS activities include monthly issue-oriented meetings, organized community service projects, group study sessions, and social events. For more information, contact Dr. Annie Baldwin (612-626-1055).

Biochemistry Club—This club strengthens ties between biochemistry students and faculty, provides personalized career guidance, helps undergraduates identify biochemistry labs for directed research, and helps students keep abreast of advances in biochemistry. For more information, contact the Office of Student Services (612-624-9717) or the Department of Biochemistry, Molecular Biology, and Biophysics (612-624-7755).

Biological Sciences Alumni Society (BSAS)—BSAS is a professional association for graduates that fosters relationships among alumni, students, faculty, and the community. Enhancing student opportunities is a top priority. Toward that end, BSAS sponsors scholarships, research and internship grants, and a mentor program. Additionally, alumni worked with the CBS Career Center to develop the Career Network, an innovative program that enables students and graduates to explore career options. For more information, contact Emily Johnston, alumni relations coordinator, 612-624-4770 or ejohnsto@cbs.umn.edu, or stop by room 123 in Snyder Hall. BSAS welcomes the opportunity to get to know future alumni.

Biological Sciences Student Association (BSSA)—Through BSSA, biology undergraduates can take on leadership roles in the college. BSSA plans educational and social activities throughout the year and invites all University biology students to attend its meetings and events. BSSA is a major contributor to Biology Week. Involvement in the association is an excellent way to meet faculty and students. For more information, contact the Office of Student Services (612-624-9717).

Headwaters Ecology Club—Through this club the University community is informed about the important contributions field stations make to learning, especially in the sciences. An important focus of Headwaters Ecology Club is to promote the Lake Itasca Forestry and Biological Station. The club sponsors social events and regularly scheduled visits and field trips to field stations. For more information, contact the Itasca office on campus (612-624-6743).

Ecology Club—This club was established in 1991 to bring together students interested in the ecological and environmental problems of the world. The meetings are basically educational; however, each activity is planned to bring together students and faculty in an informal, social atmosphere. For more information, contact the Office of Student Services (612-624-9717) or the ecology, evolution, and behavior department (612-625-5700).

Genetics, Cell Biology, and Development Club—Students formed this club to bring together students, faculty, and staff interested in these disciplines. Members enjoy speakers, educational experiences, and social activities. For more information, contact the Office of Student Services (612-624-9717) or the genetics, cell biology and development department (612-624-3003).

International Student Science and Cultural Exchange Club—This club provides an opportunity for international students to interact with one another and with the campus community. Meetings provide a forum for learning about the home countries of CBS students and exploring important features of their cultures. All members of the science community are invited to participate. For more information, contact Kathie Peterson, ISSCEC adviser (612-624-9717).

Plant Biology Club—Through this club, students have the chance to interact with other students and faculty interested in plants. Participants enjoy speakers and other educational experiences, usually in an informal, social atmosphere. For more information, contact the Office of Student Services (612-624-9717) or the plant biology department (612-625-1234).

Society for Microbiology—The society provides a forum in which students and faculty can meet informally to share common interests in microbiology. All meetings and activities reflect members' interests. Members are officially part of the Student Chapter of the American Society for Microbiology (ASM), which provides information on microbiology lectures, meetings, seminars, and local job listings. Activities include discussions of microbiological issues, social events, and visits to local employers. For more information, contact the Office of Student Services (612-624-9717) or the microbiology department (612-624-6190).

Neuroscience Club—The Neuroscience Club promotes interest in undergraduate neuroscience study and research at the University of Minnesota. Club activities include lab tours, study groups, participation in Department of Neuroscience outreach projects—such as Brain Awareness Week—and faculty-student get-togethers. Club members meet informally every other week; undergraduates interested in neuroscience are encouraged to participate. For additional information, call Kris Bettin (612-626-1458) or visit the club Web site at <www.neurosci.umn.edu/club.htm>.

Directory

(area code 612)

Office of the Dean

123 Snyder Hall (St. Paul)
624-2244

Robert P. Elde, dean
belde@cbs.umn.edu

Judson Sheridan, associate dean
Sheri012@umn.edu

John S. Anderson, interim associate dean
anderson@cbs.umn.edu

Student Services

Advising and Registration
223 Snyder Hall (St. Paul)
624-9717

cbs-advisor@cbs.umn.edu

Kathleen Peterson, director,
kathiep@cbs.umn.edu
Leah Clark, leahc@cbs.umn.edu
Sarah Huhta, shuhta@cbs.umn.edu
Jessica Murra, jmurra@cbs.umn.edu
Patrick Sherman, psherman@cbs.umn.edu

Biology Colloquium
305 Bell Museum of Natural History (Mpls.)
626-1674

Kathryn Hanna, khanna@cbs.umn.edu
James Waddell

Career Center
229 Snyder Hall (St. Paul)
624-9270

careercenter@cbs.umn.edu

Maggie Kubak, mkubak@cbs.umn.edu
Traci Mouw, tmouw@cbs.umn.edu

Community Outreach and Freshman Programming
223 Snyder Hall (St. Paul)
624-9717, cbs-advisor@cbs.umn.edu

Services for Disabled Students
210 BioSciences (St. Paul)
624-1257

Kathy Ball, kathyb@cbs.umn.edu

Honors Program
223 Snyder Hall (St. Paul)
625-5296

Franklin Barnwell, barnwell@cbs.umn.edu
Willard Koukkari, koukk001@umn.edu
Rogene Schnell, rschnell@cbs.umn.edu

International Education
610 Biological Sciences Center (St. Paul)
625-1958

Judson Sheridan, sheri012@umn.edu

Multicultural Affairs
123 Snyder Hall (St. Paul)
625-8752

John S. Anderson, anderson@cbs.umn.edu

Internship Program
229 Snyder Hall (St. Paul)
624-9270

Maggie Kubak, mkubak@cbs.umn.edu

Recruitment and Retention in the Life Sciences
123 Snyder Hall (St. Paul)
625-8752

John S. Anderson, anderson@cbs.umn.edu

Departments, Institutes, and Programs

Alumni Relations
123 Snyder Hall (St. Paul)
624-3752

Emily Johnston, ejohnsto@cbs.umn.edu

Biochemistry, Molecular Biology, and Biophysics
140 Gortner Laboratory of Biochemistry (St. Paul) 624-7755 and 6-155 Jackson Hall (Mpls.) 625-6100

David Bernlohr, head, david-b@cbs.umn.edu

Biolink/Master of Biological Sciences
123 Snyder Hall (St. Paul)
625-3133

James Fuchs, faculty adviser,
james-f@cbs.umn.edu

BioTechnology Institute
240 Gortner Laboratory of Biochemistry (St. Paul)
624-6774

Kenneth Valentas, director,
valentas@cbs.umn.edu

CBS Computing Services
625-9284

Cedar Creek Natural History Area
509 Ecology Building (St. Paul)
625-5743
Cedar Creek area
763-434-5131

G. David Tilman, director,
tilman@lter.umn.edu

Developmental Biology Center
4-122 Malcolm Moos Health Sciences Tower (Mpls.)
625-0642

Michael B. O'Connor, director,
moconnor@umn.edu

Ecology, Evolution, and Behavior
100 Ecology Building (St. Paul)
625-5700

Robert W. Sterner, head
stern007@umn.edu

Electronic Instrument Services
25 Biological Sciences Center (St. Paul)
625-8267

General Biology Program
3-140 Molecular Cellular Biology (Mpls.)
625-6636

John S. Anderson, director,
anderson@cbs.umn.edu

Genetics, Cell Biology, and Development
250 Biological Sciences Center (St. Paul)
624-3003 and 6-160 Jackson Hall (Mpls.)
624-3110
gcd@biosci.cbs.umn.edu

Brian Van Ness, head, vanne001@umn.edu

Imaging Center
35 Snyder Hall, (St. Paul)
624-3454

Mark Sanders, director,
msanders@cbs.umn.edu

Institute of Human Genetics
7-218 Malcolm Moos Health Sciences Tower (Mpls.)
625-1609

Harry Orr, director,
harry@mail.med.umn.edu

Instructional Computing Center
406 Biological Sciences Center and 170 Ecology (St. Paul)
624-2789

Itasca Biology Program
720 Biological Sciences Center (St. Paul)
624-6743

David Biesboer, director, biesboer@umn.edu
Kristen Murphy

Microbiology (Medical School)
1460 Mayo Memorial Building (Mpls.)
624-6190

Ashley T. Haase, head,
ashley@lenti.med.umn.edu

Neuroscience
6-145 Jackson Hall (Mpls.)
626-6800

Timothy J. Ebner, head
ebner001@umn.edu

Plant Biology
220 Biological Sciences Center (St. Paul)
625-1234

Kate VandenBosch, head,
vande102@umn.edu

Plant Molecular Genetics Institute
220 Biological Sciences (St. Paul)
625-1234

Susan M. Wick, director,
swick@cbs.umn.edu

Teaching Laboratory Support Staff
123 Biological Sciences Center (St. Paul)
624-2789

Jane Phillips, coordinator,
janep@cbs.umn.edu

Directors of Undergraduate Studies

Biochemistry
158 Gortner Laboratory of Biochemistry (St. Paul)
624-6275

Janet Schottel, schot002@umn.edu

Biology
123 Snyder Hall (St. Paul)
624-2244

John S. Anderson, anderson@cbs.umn.edu

Ecology, Evolution, and Behavior
412 Ecology Building (St. Paul)
625-5296

Anne E. Pusey, pusey001@umn.edu

Genetics, Cell Biology, and Development
250 Biological Sciences Center (St. Paul)
624-5399

Stuart Goldstein, golds004@umn.edu

Microbiology
1435 Mayo Memorial Building (Mpls.)
624-9933

Leslie Schiff, schiff@lenti.med.umn.edu

Neuroscience
6-145 Jackson Hall (Mpls.)
625-7623

Richard Poppele, dick@umn.edu

Plant Biology
768 Biological Sciences Center (St. Paul)
625-2761

D. Peter Snustad, pete-s@biosci.cbs.umn.edu

The CBS annual Career and Internship Fair brings in prospective employers representing the full range of career choices for CBS graduates.

College of
Biological Sciences

Degree Programs and Minors

Biochemistry

Department of Biochemistry, Molecular Biology, and Biophysics

B.S.

Biochemists study molecules found in living organisms, particularly proteins, nucleic acids, lipids, and carbohydrates. Biochemistry majors learn about the basic molecules of life to gain an understanding of how diseases like cancer and diabetes develop, and to learn how genetic engineering and biotechnology can be used to clean up the environment and improve crops.

The B.S. program in biochemistry prepares students for graduate study in biochemistry or a related biological science, professional training programs in the health sciences, or entry-level scientist positions in industry.

Biochemistry is an experimental science, and majors, especially those planning to pursue graduate studies in the field, should become acquainted with laboratory research approaches beyond those in the formal lab courses. Research options are available through BioC 4994 or BioC 4794W—Directed Research and the Honors Program. Students should consult early with their faculty adviser to begin planning the research component of their major.

Degree Requirements

Students must complete 120 credits, including at least 70 credits in the major.

The biochemistry major is based on a broad foundation in the physical sciences (mathematics, chemistry, and physics) and an extensive knowledge of the cellular, molecular, and genetic aspects of biology, in addition to formal course and laboratory work in biochemistry.

Required Courses

Complete requirements in the categories of general and organismal biology, biology core, biochemistry courses, and electives in the major. The following courses must be taken A-F unless the course is only offered S-N. Grades in all chemistry, math, physics, biochemistry and biological sciences courses taken to complete requirements in the major must be at least C-.

General and Organismal Biology—Choose sequence A or B:

Sequence A. (preferred)

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives

Biol 1002—Introductory Biology II: Molecular, Cellular, and Developmental Perspectives

Sequence B.

Biol 1009—General Biology

Choose one organismal course or course pair from the following list: Biol 2012 or Biol 3211 and Biol 2005; Biol 2022 or Biol 3002 and Biol 3005W, or Biol 3007; Biol/MicB/VPB 2032 or Biol/MicB 3301

Biology Core—Complete each of the following:

Biol 4003—Genetics

Biol 4004—Cell Biology

Choose one course or course pair from the following (courses used to meet this requirement cannot be used to meet other requirements for the major)

Biol 3211—Animal Physiology
and Biol 2005—Animal Diversity Laboratory

Biol 3002—Plant Biology
and Biol 3005W—Plant Function Laboratory

Biol 3007—Plant Biology: Diversity and Adaptation

Biol/MicB 3301—Biology of Microorganisms

Biol 3407 Ecology

Biol 3409 Evolution

Biol 3411 Introduction to Animal Behavior

Biochemistry Courses—Complete each of the following:

BioC 3960—Research Topics in Biochemistry

BioC 4025—Laboratory in Biochemistry

BioC 4331—Biochemistry I: Structure, Catalysis and Metabolism in Biological Systems

BioC 4332—Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression

BioC 4521—Introduction to Physical Biochemistry

or Chem 3501 and 3502—Physical Chemistry I-II

Electives in the Major

Six credits of electives in biochemistry or related biological disciplines (one course must include an upper division CBS laboratory experience). Course list available in 223 Snyder Hall.

Required Courses From Other Programs

The following courses must be taken A-F, unless the course is only offered S-N.

Math 1271-1272 or 1281-1282—Calculus I-II

Chem 1021-1022—Chemical Principles I-II

Chem 2301-2302—Organic Chemistry I-II

Chem 2311—Organic Lab
Chem 3501-3502—Physical Chemistry I-II
or BioC 4521—Introduction to Physical Biochemistry
Phys 1201W-1202W—General Physics I-II
or Phys 1301W-1302W—Introductory Physics I-II

Biochemistry Minor

Students must complete BioC 4331, 4332, and 4025. To declare the minor, schedule an appointment by calling 612-624-9717.

Biology

B.S.

Biology touches every aspect of our lives—from the food we eat and our health, to the plants and animals who share the planet and the air we breathe. Biology majors gain a broad understanding of the fundamental nature and characteristics of living things and the way they interact. The study of biology covers the full range of life sciences, from cancer genes to acid rain, from lichens to marine mammals.

The biology B.S. program prepares students for further study in graduate or professional schools, and also trains students for careers in industry, education, or government.

Degree Requirements

Students must complete at least 120 credits, including at least 69 credits in the major. The biology curriculum also includes courses in biology, chemistry, physics, and mathematics.

Required Courses

Complete requirements in the categories of general and organismal biology, biology core, and electives in the major. The following courses must be taken A-F, unless the course is only offered S-N. Grades in all chemistry, math, physics, and biological sciences courses used to complete requirements in the major must be at least C-.

General and Organismal Biology—Choose sequence A or B:

Sequence A (preferred sequence)

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives
Biol 1002—Introductory Biology II: Molecular, Cellular, and Developmental Perspectives
Choose one organismal biology course or course pair from the following list:
Biol 2012 or Biol 3211 and Biol 2005;
Biol 2022 or Biol 3002 and Biol 3005W or Biol 3007;
Biol/MicB/VPB 2032 or Biol/MicB 3301

Sequence B

Biol 1009—General Biology
Choose two organismal biology courses or course pairs from the following list:
Biol 2012 or Biol 3211 and Biol 2005;
Biol 2022 or Biol 3002 and Biol 3005W, or Biol 3007;
Biol/MicB/VPB 2032 or Biol/MicB 3301

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry
or BioC 4331—Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems
Biol 4003—Genetics
Biol 4004—Cell Biology
Choose one course from Biol 3407, Biol 3409, and Biol 3411

Electives in the Major—Complete each of the following:

Eleven additional upper division credits* in mathematics, physical, biological science and/or computer science. (Phsl 3051 may not be used to fulfill this requirement).
Laboratory or fieldwork in two additional upper division biological science courses or course pairs. Credits earned may be applied toward fulfilling the 11 upper division credits above. A list of acceptable courses follows:
Biol 3211 and Biol 2005, Biol 3002 and 3005W, Biol 3007, or Biol/MicB 3301 (if not used to satisfy the general and organismal biology requirement) Biol/NSci 3105 and 3115, BioC 4025, BioC 4125, BioC 4794W/4994**, EEB 4014W, EEB 4016, EEB 4129, EEB 4134, EEB 4136, EEB 4605, EEB 4794W/4994**, GCD 4015, GCD 4025, GCD 4111, GCD 4794W/4994**, MicB 4215, MicB 4235, MicB 4794W/4994**, NSci 4794W/4994**, PBio 4321, PBio 4404, PBio 4511, PBio 5416, PBio 4794W/4994**
All 38xx or 48xx CBS courses offered at the Lake Itasca Forestry and Biological Station are acceptable (if not used to complete other requirements in the major)

Required Courses From Other Programs

Math 1271-1272 or 1281-1282—Calculus I-II
Chem 1021-1022—Chemical Principles I-II
Chem 2301-2302—Organic Chemistry I-II
Chem 2311—Organic Lab
Phys 1201W-1202W—General Physics I-II
or Phys 1301W-1302W—Introductory Physics I-II

**Upper division electives (3xxx, 4xxx, or 5xxx courses having Biol 1002 or 1009 as a prerequisite) may be selected from any CBS department, as well as appropriate mathematics, physical science, and computer science courses.*

***An independent research project is strongly recommended for every student. To apply a Directed Research course to satisfy one of the upper division lab or fieldwork requirements, students must complete at least 3 credits under the 4794W/4994 course number. Biology majors may satisfy both of the lab/field course requirements through Directed Research only if 3 credits of 4794W/4994 are completed in each of two different labs. A maximum of 6 credits of 4794W/4994 counts toward the 11 upper division elective credits.*

Biology Minor

To declare a biology minor, students must make an appointment (and bring a transcript). Call 612-624-9717. All courses must be completed with a grade of at least C-.

Required Courses

1. Biol 1001 and 1002 and one organismal course
or Biol 1009 and two organismal courses in different areas.
(3xxx organismal courses count toward the 15-credit requirement under 3.)
2. Chem 1021 (Note: students also need organic chemistry for some courses on the organismal course options list below)
3. 15 upper division credits (3xxx, 4xxx, or 5xxx, with at least 3 cr at 4xxx) in biological sciences including:
One of EEB 3001, Biol/BioC 3021, GCD 3022, Biol 3407, Biol 4003, or BioC 4331.
An additional lab or field course. If directed research (BioC, EEB, GCD, MicB, NSci or PBio 4794W or 4994) is used, it must be at least 2 credits.
At least 10 credits at the U of MN, Twin Cities campus.
At least 10 credits on the A/F grading system.

Organismal course options:

Biol 2012—General Zoology with lab
Biol 2022—General Botany with lab
Biol/MicB 2032—General Microbiology with lab
Biol 3002—Plant Biology Function
and Biol 3005W—Plant Function Laboratory
Biol 3007—Plant Biology: Diversity and Adaptation with lab
Biol 3211—Animal Physiology
and Biol 2005—Animal Diversity Laboratory
Biol/MicB 3301—Biology of Microorganisms with lab

The annual Biology Week celebration features student organizations at the activities fair kick-off event.

Laboratory /field course options (if not used for organismal requirement):

BioC 4025, BioC 4125, BioC 4794W or 4994*, Biol 3002 and Biol 3005W, Biol 3007, Biol/NSci 3105 and 3115, Biol 3211 and Biol 2005, Biol/MicB 3301, EEB 4014W, EEB 4016, EEB 4129, EEB 4134, EEB 4136, EEB 4605, EEB 4794W* or 4994*, GCD 4015, GCD 4025, GCD 4111, GCD 4794W or 4994*, MicB 4215, MicB 4235, MicB 4794W or 4994*, NSci 4794W or 4994*, PBio 4404, PBio 4511, PBio 4794W or 4994*, PBio 5416

** Must complete at least 3 credits of research (4994 or 4794W) in one lab to use for a lab requirement. 4794W is directed research with a writing intensive component.*

All 38xx or 48xx Lake Itasca Field Station courses satisfy field requirement (if not used to satisfy other requirements in the major)

Biology, Society, and Environment

B.S.

This interdisciplinary major, available beginning fall 2002, combines training in biology with an examination of its relationship to society and the relevance of biology to social and environmental problems. Students may chose a theme to integrate their studies. Examples include the global environment; the ethics, economics, and politics of health care; biology and U.S. government; and communicating biology to the public. Students and advisers design a program drawing from courses offered throughout the University.

This new program option is offered jointly by CBS and the College of Liberal Arts (CLA) and replaces the CLA program in biology. For more information, contact Kathie Peterson at kathiep@cbs.umn.edu.

Ecology, Evolution, and Behavior

Department of Ecology, Evolution, and Behavior

B.S.

This program brings together the related fields of ecology, evolution, and behavior.

Ecology examines the growth and maintenance of populations and their interactions in communities, and relationships among organisms and physical events in terrestrial and aquatic ecosystems. Evolution investigates the origin and change of biological diversity by studying evolutionary patterns and processes at various temporal and spatial scales. Behavioral biology explores behavioral adaptations to the environment, mechanisms of behavior, and the evolution of social systems.

Degree Requirements

Students must complete at least 120 credits, including at least 72 credits in the major. The program also includes coursework in math, physics, and chemistry.

Required Courses

Complete requirements in the categories of general and organismal biology, biology core, and electives in the major. The following courses must be completed with A-F grades unless they are offered S-N only.

General and Organismal Biology—Choose sequence A or B:

Sequence A (preferred)

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives

Biol 1002—Introductory Biology II: Molecular, Cellular and Developmental Perspectives

Choose at least two organismal courses or course pairs representing two kingdoms (plant, animal, or microorganismal) from Biol 2012, Biol 2022, Biol 3007, Biol 3002 and 3005W, Biol/MicB/VPB 2032, Biol 3211 and 2005, Biol/MicB 3301, Ent 3005, EEB 4129, EEB 4134, EEB 4136

Sequence B

Biol 1009—General Biology

Choose three organismal courses or course pairs representing three kingdoms (plant, animal, or microorganismal) from Biol 2012, Biol 2022, Biol 3007, Biol 3002 and 3005, Biol/MicB/VPB 2032, Biol 3211 and 2005, Biol/MicB 3301, Ent 3005, EEB 4129, EEB 4134, EEB 4136

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry

At least two courses from Biol 3407, Biol 3409, and Biol 3411

One course or course pair in either genetics (Biol 4003 or GCD 3022) or physiology (Biol 3211 and 2005, Biol 3002 and 3005, Biol/MicB 3301). These courses may not be used to satisfy the general and organismal biology requirements above.

Electives in the Major

13 additional 3xxx or 4xxx ecology, evolution or behavior (and related) courses, including a biology field experience (which can be satisfied with a 4-credit course involving extensive field experience taken at the Lake Itasca Forestry and Biological Station or equivalent). Biol 3407, 3409 and 3411 credits may be used in this area if not used to meet Biology Core requirements (above). Organismal biology credits (see above list) may be used in this area if not used to meet requirements for general and organismal biology (above).

Course list for upper division major electives (other science classes are also appropriate—check with your adviser):

EEB 4002, 4014W, 4016, 4156, 4601, 4605, 4607, 4609W, 4631, 4814, 4817, 4839, 4842, 4793W, 4993, 4794W, 4994, 5008, 5009, 5011, 5013, 5033, 5051, 5053, 5122W, 5321, 5323, 5327, 5371, 5961, and other upper division science and math courses by petition

Required Courses From Other Programs

Math1281-1282 (preferred) or Math 1271-1272—Calculus I-II

Stat 3021—Introduction to Probability and Statistics

Chem 1021-1022—Chemical Principles I-II

Chem 2301-Organic Chemistry I and one of the following: Chem 2302, EEB 4631, Geo 4701, Geo 4703, Math 2243, Soil 5515, Soil 5555, Soil 5402.

Phys 1201-1202—General Physics I-II

or Phys 1301-1302—Introductory Physics I-II

Note: Grades in all chemistry, math, physics, and biological sciences courses taken to complete requirements in the major must be at least C-. All courses in the major must be taken A-F unless the course is only offered S-N.

Genetics, Cell Biology, and Development

Department of Genetics, Cell Biology, and Development

B.S.

Understanding how a fertilized egg develops into a complete organism is at the heart of the fields of genetics, cell biology, and developmental biology. The answers lie in genes—the blueprint of life carried by cells, the fundamental units of all living things. Genes direct cells to create networks that give rise to tissues, organs, and ultimately organisms, including humans. Genetics, cell biology, and development (GCD) majors learn about advances in the field by studying model organisms like plants, fruit flies, zebrafish, and mice.

Degree Requirements

Students must complete at least 120 credits, including at least 75 credits in the major. Requirements include coursework in biology, chemistry, physics, and mathematics.

Required Courses

Complete requirements in the categories of general and organismal biology, biology core, and electives in the major. Grades in all chemistry, math, physics, and biological sciences courses taken to meet requirements in the major must be at least C-. All courses in the major must be taken A-F unless the course is only offered S-N.

General and Organismal Biology—Choose sequence A or B:

Sequence A (preferred)

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives

Biol 1002—Introductory Biology II: Molecular, Cellular, and Developmental Perspectives

One organismal course or course pair from the following list:

Biol 2012 or Biol 3211 and 2005;

Biol 2022 or Biol 3002 and 3005W or Biol 3007;

Biol/MicB/VPB 2032 or Biol/MicB 3301

Sequence B

Biol 1009—General Biology

Two organismal courses or course pairs from the following list:

Biol 2012 or Biol 3211 and 2005;

Biol 2022 or Biol 3002 and 3005W or Biol 3007;

Biol/MicB/VPB 2032 or Biol/MicB 3301

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry

or BioC 4331—Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems

Biol 4003—Genetics

Biol 4004—Cell Biology

Choose one course from Biol 3407, Biol 3409, Biol 3411

Electives in the Major—Complete each of the following:

Eighteen additional credits in life sciences, physical science, mathematics, statistics and/or computer science, chosen in consultation with the major adviser. The 18 credits must include:

At least one genetics course from EEB 5033, GCD 4034, GCD 4143, GCD 4151*

At least one course in cell biology from GCD 5036, GCD 4111, GCD 4134, MicB 4131, PBio 5414, Biol/NSci 3101

At least one course in developmental biology from GCD 4151*, GCD 4161 or PBio 5416

Two laboratory courses from the following: BioC 4025, BioC 4125, GCD 4015, GCD 4025, MicB 4235, GCD 4794W or 4994—Directed Research. Must complete at least 3 credits of research (4994 or 4794W) in one lab to use for a lab requirement. A maximum of 7 credits of GCD 4794W/4994 may be applied toward the 18-credit total.

**GCD 4151—Molecular Biology of Cancer may be used to fulfill the requirement for an advanced course in either genetics or developmental biology, but not both.*

Required Courses From Other Programs

Math 1271-1272 or 1281-1282—Calculus I-II

Chem 1021-1022—Chemical Principles I-II

Chem 2301-2302—Organic Chemistry I-II

Chem 2311—Organic Laboratory

Phys 1201W-1202W—General Physics I-II

or Phys 1301W-1302W—Introductory Physics I-II

Microbiology

Department of Microbiology

B.S.

Microbes make up 60 percent of the earth's biomass. Regarded by many as the foundation of the biosphere, microbes were likely the first form of life on earth, predating plants and animals by more than three billion years. Microbiologists study the role of microbes, such as bacteria, fungi, and viruses, in our world. A key goal of microbiologists today is to find new ways to use microbes to our advantage, such as engineering bacteria to synthesize cancer drugs or clean up toxic waste sites. The microbiology major prepares students for advanced work in graduate programs and serves as preparation for a career in the health sciences. Microbiologists find employment in agriculture and industrial and pharmaceutical fields.

Degree Requirements

Students must complete at least 120 credits, including at least 75 credits in the major.

Required Courses

Complete requirements in the areas of general and organismal biology, biology core, and electives in the major. Grades in all chemistry, math, physics, and biological sciences courses taken to complete requirements in the major must be at least C-. All courses in the major must be taken A-F unless the course is only offered S-N.

General and Organismal Biology—Choose sequence A or B:

Sequence A (preferred)

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives

Biol 1002—Introductory Biology II: Molecular, Cellular, and Developmental Perspectives

Sequence B

Biol 1009—General Biology

Choose one of the following course pairs: Biol 3211 and Biol 2005 or Biol 2012;

Biol 3002 and 3005W or Biol 3007 or Biol 2022

Biology Core—Complete each of the following:

Biochemistry course: Biol/BioC 3021 or BioC 4331

Genetics course: Biol 4003

Microbiology course: Biol/MicB 3301—Biology of Microorganisms

Electives in the Major

Choose four courses from MicB 4111, MicB 4121, MicB 4131, MicB 4141W, MicB 4151, MicB 5352

Advanced laboratory courses—Choose option a or b:

a. MicB 4215—Advanced Laboratory: Microbial Physiology and Diversity

and MicB 4235—Advanced Laboratory: Virology, Immunology, and Microbial Genetics

b. MicB 4215 or MicB 4235 plus 6 credits of MicB 4794W/4994—Directed Research, completed in one lab

Award-winning teachers and advisers are a tradition in CBS. The college currently has 12 Morse-Alumni Outstanding Undergraduate Teachers and six John Tate Undergraduate Advising Award winners.

Required Courses From Other Programs

Math 1271-1272 or 1281-1282—Calculus I-II
Chem 1021-1022—Chemical Principles I-II
Chem 2301-2302—Organic Chemistry I-II, Chem 2311—Organic Lab
Phys 1301W-1302W—Introductory Physics I-II
or Phys 1201W-1202W—General Physics I-II

Neuroscience

Department of Neuroscience

B.S.

Neuroscientists study the molecular and cellular building blocks that make up the brain and control its function. Neuroscience majors learn how people see and hear, move, think and feel. They also study abnormalities that cause diseases and mechanisms that underlie pain and addiction.

The major prepares undergraduates to pursue advanced studies in neuroscience; a professional degree in medicine or psychology; or careers in the rapidly growing areas of the pharmaceutical, medical, or biotechnology industries.

Degree Requirements

Students must complete at least 120 credits, including at least 89 credits in the major. Requirements also include courses in biology, chemistry, physics, and mathematics.

Required Courses

Complete requirements in categories of general and organismal biology, biology core, neuroscience courses, and electives in the major. Grades in all chemistry, math, physics, and biological sciences courses taken to meet requirements in the major must be at least C-. All courses in the major must be taken A-F unless the course is only offered S-N.

General and Organismal Biology—Choose sequence A or B:

Sequence A (preferred)

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives
Biol 1002—Introductory Biology II: Molecular, Cellular, and Developmental Perspectives
Biol 3211—Animal Physiology
or Phsl 3051—Human Physiology
and Biol 2005—Animal Diversity Laboratory
or Biol 2012—Zoology

Sequence B

Biol 1009—General Biology
Biol 3211—Animal Physiology
and Biol 2005—Animal Diversity Laboratory
or Phsl 3051—Human Physiology
and Biol 2005—Animal Diversity Laboratory
or Biol 2012—Zoology
Choose one organismal course or course pair from the following list: Biol 2022, Biol/MicB/VPB 2032, Biol 3002 and 3005W, Biol 3007, Biol/MicB 3301

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry
or BioC 4331—Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems
Biol 4003—Genetics
Biol 4004—Cell Biology
Biol 3407—Ecology
or Biol 3409—Evolution
or Biol 3411—Introduction to Animal Behavior

Neuroscience Courses—Complete each of the following:

Biol/NSci 3101—Introduction to Neuroscience I: From Molecules to Madness
Biol/NSci 3102W—Introduction to Neuroscience II: Biological Basis of Behavior
Biol/NSci 4105-4115—Neurobiology Laboratory I-II
At least 2 credits of NSci 4794W/4994—Directed Research

Electives in the Major

Choose a minimum of 9 credits from groups A-C with at least one course in each group:

Group A—Cell and molecular biology

NSc 5461—Cellular and Molecular Neuroscience
GCD 4034—Molecular Genetics
GCD 5036—Molecular Cell Biology
EEB 5221—Molecular and Genomic Evolution
Other courses must be approved by the Director of Undergraduate Studies (requires petition)

Group B—Neural systems and behavior

EEB 5321—Evolution of Social Behavior
EEB 5323—Neural and Endocrine Mechanisms Underlying Vertebrate Behavior
EEB 5327—Behavioral Ecology
NSci 4151—Advanced Topics in Neuroscience (Spring)
NSc 5202—Theoretical Neuroscience: Systems and Information Processing
NSc 5462—Neuroscience of Drug Abuse
NSc 5481—Invertebrate Neurobiology
NSc 5661—Behavioral Neuroscience
Psy 5036W—Computational Vision
Psy 5038W—Introduction to Neural Networks
Psy 5061—Neurobiology of Behavior
Other courses must be approved by the Director of Undergraduate Studies (requires petition)

Group C—History and philosophy of science

HSci 3211—Biology and Culture in the 19th and 20th Centuries
HSci 3242—Darwinian Revolution
Phil 3601W—Scientific Thought
Phil 4607W—Philosophy of Biological Science

Required Courses From Other Programs

Math 1271-1272 or 1281-1282—Calculus I-II
Chem 1021-1022—Chemical Principles I-II
Chem 2301-2302—Organic Chemistry I-II
Chem 2311—Organic Lab
Phys 1201W-1202W—General Physics I-II
or Phys 1301W-1302W—Introductory Physics I-II

Plant Biology

Department of Plant Biology

B.S.

Plant biologists study the genetics, development, and evolution of plants. They make important contributions to analyzing and preserving biodiversity worldwide. They work to enhance the nutritional value of crops as well as their resistance to disease, pests, and drought while working to reduce the need for pesticides, fertilizer, and irrigation.

Current faculty research interests include gene expression, chromosome structure, plant growth substances, signal transduction, plant responses to stress, the plant cytoskeleton and cell morphogenesis, metabolic activities during development, cellular structure and ultrastructure of vascular and nonvascular plants, aquatic biology, lichenology, molecular evolution and systematics, fungal/plant interactions, biological rhythms, and fungal diversity.

Plant biology majors follow one of two tracks. One track fits the needs of students who are primarily interested in organismal or environmental biology, while the other track is appropriate for students interested in molecular, cellular, and development biology.

Degree Requirements

Students must complete at least 120 credits, including 66 credits in the major. The program also includes coursework in mathematics, physics, and chemistry. Grades in all chemistry, math, physics, and biological sciences courses taken to meet requirements in the major must be at least C-.

Required Courses

Complete requirements in categories of general and organismal biology, biology core, laboratory or fieldwork, and electives in the major.

General and Organismal Biology—Choose sequence A or B:

Sequence A (preferred)

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives

Biol 1002W—Introductory Biology II: Molecular, Cellular, and Developmental Perspectives

Plus either Biol 3002 and 3005, or Biol 3007

Sequence B

Biol 1009—General Biology

Plus Biol 3002 and 3005, and Biol 3007

Students who decide to major in plant biology after taking a course in general botany may substitute that course for either Biol 3002 and 3005, or Biol 3007.

Biology Core

Biol/BioC 3021—Biochemistry

Biol 3407—Ecology

or Biol 3409—Evolution

or Biol 3411—Introduction to Animal Behavior

Biol 4003—Genetics

or Biol 4004—Cell Biology

Laboratory or Fieldwork

Choose two courses or course pairs from the following list

Biol 3211 and 2005; Biol/MicB 3301; Biol/NSci 3105 and 3115; BioC 4125; BioC 4025; BioC 4794W/4994; EEB 4014W; EEB 4016; EEB 4129; EEB 4134; EEB 4136; EEB 4605; EEB 4607; EEB 4631; EEB 4794W/4994; GCD 4015; GCD 4025; GCD 4111; GCD 4794W/4994; MicB 4215; MicB 4235; MicB 4794W/4994; NSci 4794W/4994; PBio 4321; PBio 4404; PBio 4511; PBio 5416; PBio 4794W/4994; or any 38xx or 48xx CBS course offered at the Lake Itasca Forestry and Biological Station. Biol 3002 and 3005W or Biol 3007 may be used to meet a laboratory/field requirement if not used to meet plant biology requirements in Sequence A (above)

Electives in the Major

Choose three courses from the following list, with at least one course each from Group A and Group B. Other appropriate courses may be substituted by petition.

Group A—Integrative and organismal biology

EEB 4014W—Ecology of Vegetation

PBio 4321—Taxonomy of Minnesota Flora

or PBio 4511—Flowering Plant Systematics

PBio 4404—Developmental Plant Anatomy

PBio 5416—Plant Morphology, Development and Evolution

or EEB 5122W—Plant Interactions with Animals and Microbes

Group B—Cellular and subcellular biology

BioC 5401W—Advanced Metabolism and its Regulation

PBio 5103—Plant Genomics

PBio 5412—Plant Physiology

PBio 5414—Plant Cell and Molecular Biology

or PBio 5640—Discussions in Plant Molecular Biology

Required Courses From Other Programs

Math 1271-1272 or 1281-1282—Calculus I-II

Chem 1021-1022—Chemical Principles I-II

Chem 2301-2302—Organic Chemistry I-II

Chem 2311—Organic Lab

Phys 1201-1202—General Physics I-II

or Phys 1301-1302—Introductory Physics I-II

Note: All courses in the major must be taken A-F unless the course is only offered S-N.

Plant Biology Minor

Students must complete four courses in this list:

Biol 3002—Plant Biology: Function

Biol 3005—Plant Function Laboratory

Biol 3007—Plant Biology: Diversity and Adaptation

Choose one course from PBio 4321, 4404, 4511

This is the College of Continuing Education section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

College of Continuing Education

Degree Programs and Minors

Bachelor of Applied Science Degrees

College of Continuing Education

General Information

The College of Continuing Education (CCE) provides high-quality continuing education and lifelong learning opportunities for professional development, personal enrichment, career transition, and academic growth. Established in 1913, CCE has one of the most comprehensive continuing education units in the country and serves as the University's main access point for nontraditional students, particularly adult and part-time learners.

CCE offers a variety of degrees, certificates, and continuing professional education opportunities. With programs and services that cross the usual boundaries of time, place, mode of delivery, and academic discipline, CCE provides the knowledge and skills required in an information-based world and workplace. And, through CCE, non-admitted students can access University courses. Therefore, students interested in earning a degree can start taking courses to fulfill requirements before formally applying to their college of choice.

Admission

Admission to CCE Degree and Certificate Programs—All CCE degree programs have their own admission policies and procedures and admit at the upper division only. For general questions about admission to CCE degree or certificate programs, contact CCE Student Support Services at 612-624-4000. For more specific information, see Admission Requirements for each program in the CCE Degree Program section or go to the CCE Web site at <www.cce.umn.edu> and select the program of interest.

Liberal Education Requirements—Within CCE, the Inter-College Program (ICP) and the Program for Individualized Learning (PIL) follow the University's standardized set of liberal education requirements. The bachelor of applied science degree (B.A.S.) has liberal education requirements unique to each major. Please see the B.A.S. Web site at <www.cce.umn.edu/bas> or contact a student support service adviser for requirement information.

Degrees

Students have two broad options for earning baccalaureate degrees through CCE—an individualized degree or applied degree. For more information about these options, call 612-624-4000, or visit the CCE Web site at <www.cce.umn.edu>.

Individualized Degree Programs

Individualized degree programs open up educational opportunities for highly motivated students who need flexibility to earn their B.A. or B.S. degrees. Students develop degree programs tailored to their interests and talents.

CCE links the rich resources of the University's faculty and staff with the individual undergraduate. Students, faculty, and staff work together to take responsibility for the integrity of each degree program and the maintenance of high academic standards. As a result, our graduates gain a strong sense of ownership of their education and confidence in how that education is related to their lives.

CCE's individualized programs serve students by offering educational alternatives; the programs serve faculty by allowing them to develop and test innovative approaches to undergraduate education. Working together, the two groups help diversify learning experiences at the University.

Inter-College Program (ICP), founded in 1930, offers students a credit-based, individualized baccalaureate degree program drawing on the curricular offerings and other educational resources of the entire University community. This program provides an alternative to an already established major by giving students the flexibility to incorporate both day school and evening coursework from more than one college to achieve their educational goals. Call 612-624-2004 for more information or see <www.cce.umn.edu/icp> on the Web.

Program for Individualized Learning (PIL), founded in 1971, serves independent learners who wish to design and complete individualized study that incorporates a variety of learning resources and strategies, such as independent learning projects. PIL students work collaboratively with academic advisers and faculty throughout the University.

The program primarily serves students who live in the Twin Cities area, but also considers qualified students who can commute to campus for some learning activities. For more information, call 612-624-4020, e-mail pil@cce.umn.edu, or see <www.cce.umn.edu/pil> on the Web.

Bachelor of Applied Science (B.A.S.) Degrees

Students may also consider one of seven majors within the B.A.S. degree offered in partnership with Minnesota State Colleges and Universities (MnSCU)—primarily area community colleges. These majors are designed for career-minded adults and include clinical laboratory science, construction management, information networking, information technology infrastructure, manufacturing technology, network administration, and radiation therapy. For more information about any of the B.A.S. degrees, please go to the B.A.S. Web site at <www.cce.umn.edu/bas>.

The B.A.S. with a major in clinical laboratory science is a course of study that provides the education clinical laboratory technicians/medical laboratory technicians (CLT/MLT) need for career advancement. Clinical laboratory science gives students a strong foundation in the sciences together with rich experiences in the clinical laboratory. Graduates are prepared to work as clinical laboratory scientists, technical specialists, laboratory managers, lab coordinators, and quality control technologists. CLT/MLT individuals can obtain a B.A.S. degree and take the national certification examinations to practice as a clinical laboratory scientist/medical technologist (CLS/MT). Offered in partnership with MnSCU, students can complete a two-year CLT/MLT associate's degree before enrolling in the B.A.S. program at the University of Minnesota.

The B.A.S with a major in construction management is offered in close collaboration with the construction industry and in partnership with North Hennepin Community College in Brooklyn Park and Inver Hills Community College in Inver Grove Heights. Construction management combines building design and engineering with management and business skills to equip students with the skills needed to deliver projects on time and within budget. The major offers experience and education for a professional management career in the construction industry.

The B.A.S. with a major in emergency health services is offered cooperatively with Inver Hills Community College in Inver Grove Heights and Regions Hospital in St. Paul. The program is designed to provide personnel working in pre-hospital medical care with the management, education, and skills necessary to coordinate and direct the delivery of emergency health services in a variety of settings, ranging from out-of-hospital, first-responder situations to occupational health and safety programs in large organizations.

The B.A.S. with a major in information networking is an interdisciplinary blend of computer science, management of information systems, liberal arts, science and engineering, and practical hands-on experience. Students study the design and management of voice, video, and data transmissions over various networks and between different platforms. Graduates are prepared to assume a wide range of positions related to network design, engineering, and administration. The B.A.S. in information networking is offered in partnership with area community colleges.

The B.A.S. with a major in information technology infrastructure is a course of study combining information technology infrastructure, math, science, and business curricula. Students may choose a network, system administration, or database concentration area. Graduates are able to design, construct, and manage technology operations. The B.A.S. in information technology infrastructure is offered in partnership with area community colleges. This major replaces the B.A.S. majors in information networking and network administration.

The B.A.S. with a major in manufacturing technology is a course of study that prepares students for career growth in the manufacturing industry. Students learn new skills in the areas of manufacturing systems and processes, computer technology, quality, operations, project management, business and finance, and interpersonal communication. Graduates are prepared to work as project managers, process engineers, materials managers, lead technicians, order process analysts, facilities engineers, and business analysts. The B.A.S. in manufacturing technology is offered in Rochester in partnership with the University of Minnesota—Rochester, Rochester Community and Technical College, and Winona State University—Rochester Center. The B.A.S. in manufacturing technology is offered in the Twin Cities in partnership with area community colleges.

The B.A.S. with a major in network administration is designed to educate students in business and networking technology so they can function in both environments. Students learn to make business decisions with an understanding of their technical implications and technical decisions with an understanding of their business purposes and needs. The program enables students to develop both practical technical skills, useful in entry level positions, and a broad, high-level understanding of computer networking and business information systems. The B.A.S. in network administration is offered in partnership with area community colleges.

The B.A.S. with a major in radiation therapy is a course of study designed to prepare individuals for a career in radiation therapy focusing on the changing demands of new technologies and advancements in treatment techniques. Students sharpen critical thinking and problem solving skills and expand their knowledge base to include the management and education skills necessary for future advancement. The medical and technical courses and clinical experience are provided through the Fairview-University Medical Center's School of Radiation Therapy in the Twin Cities.

Note: Students are limited to taking a maximum of 25 business or management content course credits in a major, and are also limited to a maximum of 25 percent business or management course credits for a degree.

The applied business major with the bachelor of applied science degree program has been discontinued. We are no longer able to accept applications for admission to this program. Please see the other B.A.S. degree programs, the Program for Individualized Learning, or the Inter-College Program for alternative degree program options in CCE. If you have concerns about how this change may affect your academic plans, contact the department at bas@cce.umn.edu or CCE Student Support Services at 612-624-4000.

Other Degree Programs

Several other University of Minnesota degrees may be earned entirely or almost entirely through CCE registration in evening and Independent and Distance Learning courses.

Certificates

In addition to baccalaureate degrees, certificate programs offered through CCE provide an educational option for working adults. Certificates are short-term, focused college credentials that can supplement a student's experience and previously earned degree, or serve as a stepping stone to a degree. Certificates provide concentrated coursework related to occupational areas or general background to prepare students for further college work.

Coursework may be completed with evening classes, Independent and Distance Learning, day classes, summer session classes, or any combination of these. For more information, call CCE Student Support Services at 612-624-4000 or e-mail adv@cce.umn.edu.

College of Continuing Education Certificates

Accounting
Addictions studies
Business administration
Child abuse prevention studies
Civil engineering
Computer science
Electrical and computer engineering
Engineering and science
Information networking
Mechanical engineering
Ophthalmology technician
Organizational and professional communication
Policy issues on work and pay
Radiation therapy

Honors

All CCE degree programs recognize outstanding academic achievement by offering an honors and/or distinction option for graduating students.

Graduation Requirements

A minimum of 120 credits acceptable to the college are required for all CCE bachelor degrees. A minimum of 30 University credits must apply to the degree and students must maintain a minimum GPA of 2.00. See ICP and PIL in the Degree Programs section for detailed graduation requirements.

See the CCE Web site at <www.cce.umn.edu> for more detailed information about the B.A.S. degrees including admission criteria, industry connections, FAQs, and much more.

Advising

CCE Student Support Services—The CCE Student Support Services office offers academic advising and financial aid advising to all students interested in CCE degrees and certificates. Advisers can help students select programs of study, determine prerequisites, interpret degree requirements, discuss transcripts of previous college work, and choose courses.

Students seeking a college degree through registration in CCE classes should consult an adviser early in their planning. For more information, contact CCE Student Support Services at adv@cce.umn.edu or 612-624-4000.

Special Learning Opportunities and Resources

Independent and Distance Learning (IDL) courses use mail and electronic technologies to meet the needs of students who cannot or choose not to take courses on campus. Most courses are self-paced and give students up to nine months to complete the coursework. Credits are recorded on students' transcripts and can be used toward fulfilling distribution requirements in most undergraduate programs. IDL courses can also satisfy residency requirements, with approval from the student's college. Check with an adviser about using these course credits toward a program.

Students may register by fax, mail, or in person. Courses are either extended term (to be completed in up to nine months) or term-based (to be completed within one semester term). For students receiving financial aid administered by the Office of Student Finance (OSF), term-based online courses are automatically counted. Extended-term courses (both online and correspondence) are not eligible for OSF-administered aid.

For information on courses, policies, and registration, please visit <www.cce.umn.edu/idl> or request an *Independent and Distance Learning Catalog.* Contact us at 612-624-4000 or 800-234-6564, or e-mail indstudy@umn.edu.

Independent Study (ICP 3075)—CCE allows undergraduates, regardless of college affiliation, to pursue projects beyond the scope of a single department or college. Projects are interdisciplinary or are completed in departments that do not offer an appropriate independent study course. Students may take 3–5 credits of ICP 3075—Independent Study. For more information, contact ICP at 612-624-2004.

Scholarships and Grants

The College of Continuing Education Student Support Services administers CCE scholarship and grant programs and provides information to CCE students about other financial aid options.

CCE grant and scholarship programs are designed for students who reside in Minnesota, who have had to delay or interrupt their education, and have financial need but are unserved or underserved by other grant, scholarship, or tuition reimbursement programs. In addition to financial need, scholarships are awarded on the basis of academic ability and a statement of personal, educational, and career goals. They are supported by donations from CCE alumni and friends. For more information, go to <www.cce.umn.edu> and click on Financial Aid, contact CCE Student Support Services at 612-624-4000 or e-mail adv@cce.umn.edu.

Directory

(area code 612)

CCE Student Support Services

150 Wesbrook Hall
77 Pleasant Street SE
Minneapolis, MN 55455
624-4000
Fax: 625-1511
E-mail: adv@cce.umn.edu

Administrative Offices

Office of the Dean
201 Coffey Hall
St. Paul, MN 55108
624-5332
Mary Nichols, dean, 624-1751

Administrative Units

Academic Programs
624-8831

College in the Schools
626-0214

Compleat Scholar
625-7777

Continuing Professional Education
625-3100

Master of Liberal Studies
626-8724

Personal Enrichment Programs
625-5760

Departments and Programs

Bachelor of Applied Science (B.A.S.)

- Clinical Laboratory Science
- Construction Management
- Emergency Health Services
- Information Networking
- Information Technology Infrastructure
- Manufacturing Technology
- Network Administration
- Radiation Therapy

101 Wesbrook Hall, Minneapolis, MN 55455
624-4000
E-mail: bas@cce.umn.edu

Inter-College Program (ICP)
107 Armory Building, Minneapolis, MN 55455
624-2004
Josh Borowicz, program director, 624-2004
E-mail: icp@umn.edu
<www.cce.umn.edu/icp>

Program For Individualized Learning (PIL)
107 Armory Building, Minneapolis, MN 55455
624-4020
Mary Sue Simmons, program director, 624-4020
E-mail: pil@cce.umn.edu
<www.cce.umn.edu/pil>

College of Continuing Education

Degree Programs and Minors

Inter-College Program (ICP)

Founded in 1930, the Inter-College Program (ICP) embodies the University of Minnesota's commitment to individualized undergraduate education by providing cross-college, course/credit-based degree options. Drawing upon the curricular offerings of most of the University's colleges and departments, students design either a bachelor of arts (B.A.) or a bachelor of science (B.S.) degree incorporating a significant amount of coursework from at least two different colleges within the University system.

ICP is most appropriate for self-directed students whose educational backgrounds, and career and intellectual interests require both a clear personal focus and a flexible interdisciplinary approach.

ICP Degree Program Design

An ICP degree program may be structured in one of the following ways:

- A **two area** cross-college program, such as business and history (through the Carlson School of Management and CLA), or educational psychology and French (through the College of Education and Human Development and CLA).

  Students seeking a B.A. degree must complete 20 upper division credits in each of the two areas. Students pursuing a B.S. degree must complete 21 upper division credits in each area and 8 supporting upper division credits.
- A **three area** cross-college program, such as applied business, speech communication, and psychology (through CCE and CLA); or housing, child psychology, and public health (through the College of Human Ecology, CLA, and School of Public Health).

  B.A. students must complete 20 upper division credits in one area and 12 in each of the other two areas. B.S. students must complete 20 upper division credits in one area and 15 in each of the other two.
- A **thematic** cross-college program, such as "aging studies," integrates coursework from several departments—sociology (CLA), public health (School of Public Health), family education (College of Education and Human Development), and social work (College of Human Ecology). Thematic programs are appropriate only when students' objectives are clearly focused on one topic that cannot be pursued in a two- or three-area program.

  B.A. students must complete 40 upper division credits on a theme. B.S. students must complete 50 upper division credits, with no more than 15 credits in any one department. B.A. students must complete ICP's second-language requirement.

Special Learning Resources

ICP students may blend a variety of learning experiences—internships, foreign study, directed study or research—with their formal coursework; however, these are generally arranged as credit-bearing experiences.

Admission Process

Admission to ICP has both procedural and academic components. Once students have met the academic requirements, they can be admitted at various points in the degree-planning process. All students begin this process with a First Step meeting and should complete degree planning within a semester. Timely admission to the program requires close communication with an ICP adviser.

A. First Step Meetings

Several times each week, ICP holds small-group informational sessions called First Step meetings. Academic advisers provide a detailed introduction to the program and help students begin the planning process. Students are advised to attend a First Step meeting early in the process.

To schedule an appointment for a First Step meeting, call 612-624-2004 or visit the ICP office at 107 Armory, 15 Church Street S.E., Minneapolis, MN 55455.

B. Admission Requirements

Admission into ICP requires:

- An overall GPA of 2.00; a 2.00 GPA in upper division coursework; and a 2.00 GPA in each proposed area of concentration.
- Completion of 50 credits of college-level learning.

- Completion of at least 9 credits from the University of Minnesota.
- Completion of at least two upper division courses, preferably in proposed areas of concentration.
- Completion of designated prerequisites and meeting GPA requirements for specific areas of concentration, such as those offered by the Carlson School of Management (complete lists are available at First Step meetings).
- Development of a degree plan that includes:
  1) A description of academic and career goals.
  2) An outline of courses proposed for the degree program (degree plans may not parallel or duplicate existing degree programs at the University).
- Approval of the proposed degree plan from at least two designated faculty or departmental advisers.

Developing a Degree Proposal and Plan

A. Meetings with Academic Advisers

After attending a First Step meeting, students work individually with an ICP academic adviser to develop a degree proposal. This proposal includes a comprehensive statement of academic and career goals and a corresponding list of courses and other activities that students expect to complete in the degree program. Through meetings with an academic adviser, students refine their proposals and identify the best courses and special learning resources to achieve educational goals.

B. Preparing a Statement of Academic and Career Goals

The first task in developing a degree plan is preparing a statement of personal educational goals and objectives. While the statement need not be lengthy, it must clearly describe what students want to learn and why. The document identifies the specific skills, information, or knowledge that students hope to acquire and their reasons for wanting them. It should also describe long-range goals, including plans for a specific career or academic study beyond the baccalaureate degree.

C. Preparing a Course List

The second part of the degree plan is the course list, which includes the learning experiences proposed for the degree program. Students must develop a list of all the courses and other learning experiences planned for the ICP degree program, including any appropriate courses that have already been completed.

D. Meetings with Faculty Advisers

At the end of the degree planning process, students meet with faculty and/or academic professional advisers in their proposed area of study for departmental review, input, and approval of the degree program. If necessary, students may be referred to faculty/department advisers earlier in the process. All changes to areas of concentration must be approved by these departmental advisers.

Completing an ICP Degree

After admission to ICP, students may take day, evening, or correspondence courses.

Faculty advisers offer guidance throughout the program. If necessary, they can help revise the degree plan as students move through the program and may help design and complete independent studies and research.

ICP's academic advisers can also assist throughout the degree program by answering questions about program revisions, independent study, honors options, and completion of graduation requirements.

Financial Aid—Many forms of financial assistance are available to all University students, including grants, loans, scholarships, or work-study. For information on all sources of financial aid and to obtain the application packet, contact the Office of Student Finance, 210 Fraser Hall, 106 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-1665). Students who are employed should investigate their companies' tuition reimbursement programs; contact the personnel or human resource development office for more information.

Career and Placement Services—Early planning is important to prepare for a specific career or for admission to graduate or professional schools. ICP academic advisers refer students to career development and placement services on campus and help in planning for graduate or professional education.

Liberal Education

A foundation in liberal education is required to provide breadth to learning and to integrate different academic disciplines and methods of inquiry into the process. ICP students must complete Twin Cities liberal education requirements and the oral/written communication requirements in effect at the time of the student's admission or readmission to the University.

Graduation Requirements

To earn the ICP degree, students must satisfy the following graduation requirements:

- Complete the courses and other learning activities selected for the ICP degree program.
- Complete liberal education requirements for the B.A. or B.S.
- Complete a minimum of 120 credits, including transfer and extension courses.
- Complete 50 upper division credits for the B.A. or B.S.
- Complete 30 University of Minnesota credits that apply to the degree.
- Complete a residency requirement of at least 24 semester credits in the program.
- Maintain at least a 2.00 GPA overall, in upper division work and in degree program work, computed separately.

Program for Individualized Learning (PIL)

PIL allows students to use their creativity and academic skills to shape their undergraduate college education. By designing and implementing their own degree programs, students embark on one of the most stimulating and challenging experiences of their educational careers.

The program blends tradition and innovation, allowing students to combine the best of traditional practices and resources with new concepts and strategies for defining curriculum, learning independently, and evaluating learning. The program strives to recognize the knowledge and experience that distinguishes adult students and allows them more control over the content, structure, and pace of learning.

The length of time or cost required to complete a PIL degree program is be difficult to predict. It usually requires about as much time as a traditional program, but can offer greater flexibility and control of students' time.

The program began in 1971 as one of the original University Without Walls programs founded through cooperative efforts at institutions around the country. The program was based on the belief that people learn in many different ways, at different times and places in their lives, and that they should be actively involved in their own learning.

PIL is headquartered on the University's Minneapolis campus, but students may work with faculty on any of the University campuses.

Criterion-Based Education

This program challenges students to think about learning in new ways. A set of standards, called graduation criteria, describes the basic academic structure of the bachelor's degree. These criteria, rather than number of credits, provide the framework for structuring the degree program and assessing its success.

Students use the graduation criteria to build their own degree programs. Students are encouraged to be creative and to use a variety of learning activities (courses and projects) to satisfy each criterion. Courses that have already been completed may be used to fulfill the graduation criteria; students can also demonstrate college-level learning achieved through work, experience, and independent study. New learning activities may explore untapped interests or build on prior learning. These activities may include independent projects, internships, work-based projects, and classroom and correspondence coursework.

Graduation Criteria for the B.A. and B.S. Degrees

A PIL degree requires achievement and excellence equal to other baccalaureate programs at the University of Minnesota. The graduation criteria require in-depth knowledge in an area of concentration (depth criteria) and broad learning in the liberal arts (breadth criteria). Regardless of the area of concentration, the B.S. emphasizes the student's field of study, while the B.A. emphasizes broader learning in the breadth criteria.

I. Depth Criteria: Area of Concentration

The program serves students who want to develop an area of concentration with some or all of the following attributes:

- Focused on interdisciplinary or multidisciplinary studies, or a specialized study within a broader academic context.
- Built on the academic strengths of the University.
- Designed as a foundation for graduate or professional education.
- Not readily available as a structured undergraduate degree program.

The area of concentration, traditionally called a "major," should reflect balance, depth, and quality in a field of study. The student's area of concentration must fulfill the following three depth criteria:

Criterion A: Primary Area Studies (B.A. and B.S.)— Through learning activities in their primary area studies, students acquire familiarity with the basic literature and vocabulary of their field, knowledge of its main theories and methods of investigation, ability to use the skills of the field, and an awareness of its relationship to contemporary and future society.

Criterion B: Major Project (B.A. and B.S.)—As a culmination of study in their area of concentration, students complete a major project that reflects substantive understanding of their field of study.

Criterion C: Extended Studies in the Area of Concentration (B.S. only)—Students complete learning activities that bring a broader perspective to their area of concentration. These studies add knowledge that complements and expands on the primary area studies.

Areas of concentration of some recent students include: children's mental health, community development and education, conservation biology, early and Celtic Christianity, environmental communication, family systems in the health sciences, international business with emphasis on Russia, organizational training, development, and communication, preservation of historic architecture, zoology and zoo management.

II. Breadth Criteria: Liberal Education Requirements

Learning in the liberal arts comprises a substantial portion of the individualized degree program. The goal of liberal education is to help students explore new ideas, concepts, and ways of viewing the world.

All PIL students include study in the broad areas that typify a liberal education. Whether seeking a B.A. or B.S., all students must complete learning for criteria 1–6; at least three of these criteria should incorporate upper division learning. In addition, students seeking a B.A. must complete requirements for Criterion 7.

Criterion 1: Physical and Biological Sciences—Studies involve comprehension of physical and biological principles; understanding of and an ability to use the methods of scientific inquiry—the ways in which scientists investigate physical and biological phenomena; and appreciation of the importance of science and the value of a scientific perspective.

Criterion 2: Social Sciences and Humanities—Studies involve knowledge of how social scientists, artists, and humanistic scholars think, describe, analyze, and portray human experiences and behavior; study of the interrelationships among individuals, institutions, structures, events, and ideas; understanding of the roles individuals play in their cultural, social, economic, aesthetic, and political worlds; and understanding of aesthetic judgments.

Criterion 3: Historical Perspective—Studies involve knowledge of how historians describe and analyze human experiences and behavior; and understanding of the roles individuals play in their historical worlds.

Criterion 4: Mathematical Thinking—Studies involve acquiring mathematical modes of thinking; ability to evaluate arguments, detect fallacious reasoning, and evaluate complex reasoning chains; and appreciation of the breadth of applications of mathematics and its foundations.

Criterion 5: Communication—Studies involve examining communication theory and skills. Learning may focus on developing second-language skills or developing and refining knowledge and abilities in areas such as small group communication, public speaking and presentation, organizational communication, visual communication, and mass communication.

Criterion 6: Understanding of Place—Studies involve an understanding of the student's place in the world by examining relationships among nations, peoples, and cultures. This criterion specifically calls for students to make connections between a variety of perspectives, including historical, geographical, social, economic, artistic, cultural, and religious factors.

For B.A. programs:

Criterion 7: Extended Studies in the Liberal Arts— Studies involve acquiring in-depth and advanced understanding of a focused liberal arts area; an interdisciplinary approach may also be proposed. Learning should include critical and theoretical understanding and upper division knowledge.

The University's liberal education requirements are integrated into PIL through its breadth criteria, learning matrix, and reading and writing criteria. Because PIL is not credit-based, the precise amount of learning needed to

The College of Continuing Education is the University of Minnesota's major point of access and educational opportunity for the nontraditional, part-time, summer, and distance learner.

address these three criteria are developed on an individual basis. If students are transferring into PIL from another college at the University, students will be able to use any previously accepted liberal education learning as part of their PIL requirement.

III. Learning Matrix

To broaden perspectives on liberal learning, degree programs must also examine a set of liberal education themes. Each theme focuses on an issue of compelling importance to the nation and the world, the understanding of which is informed by many disciplines and interdisciplinary fields of knowledge. While planning learning activities for the breadth criteria, and in some cases the depth criteria, students must ensure that their degree program incorporates the following themes from the learning matrix:

I. Cultural Diversity—Understanding the roles gender, ethnicity, and race play in structuring the human experience in and developing the social and cultural fabric of the United States.

II. International Perspectives—Comprehending the ways in which you are part of a rapidly changing global environment dominated by the internationalization of most human endeavors.

III. Environment—Knowledge of the interaction and interdependence of the biophysical systems of the natural environment and human, social, and cultural systems.

IV. Citizenship and Public Ethics—Reflection on and determination of a clearer sense of your present and future civic relationships and obligations to the community.

V. Creation of Meaning—Understanding the ways people and cultures make meaning out of their existence through myths, religions, rituals, folklore, symbols, and cosmologies.

IV. Reading and Writing Criteria

The ability to communicate effectively is a hallmark of a liberally educated individual and key to a successful and satisfying life. The degree program includes knowledge and skill in writing across the curriculum; students must develop their abilities in written communication from admission to graduation. Finally, the completed degree program will include at least four writing-intensive learning experiences.

Reading is a critical component of the area of concentration as students must expose themselves to a broad range of texts and journals of the field. While carrying out learning for the breadth criteria and learning matrix, students read across many disciplines. As part of PIL, students are expected to include the study of literature (poetry, short stories, novels, and dramatic literature) as part of learning for Criterion 2. Study of literature allows students to build skill and knowledge in writing and reading.

A Four-Stage Program

Students, advisers, staff, and faculty work together to create an atmosphere of challenge and support to help students meet the special demands of each stage of the program. Procedures for completing various stages of the degree and meeting PIL registration and tuition requirements are outlined below.

Specific registrations depend on the stage students are in and the learning activities they are pursuing. All registrations described below are required of PIL students.

I. Admissions Stage

In the admissions stage, students meet with the program's admissions committee to determine whether the student's goals and PIL's approach to individualized learning are a good match.

Students can learn more through information meetings and, later, individual appointments. To arrange to attend an information meeting (early evening sessions are available), call the PIL office at 612-624-4020.

To be considered for admission, students must submit an application (available at information meetings or from our office) that documents their ability to undertake a self-directed, individualized degree program. Students should have completed at least 30 college credits to be considered for admission. The program seeks students who:

- Know why they are seeking a bachelor's degree and why PIL is a sound choice for them.
- Can describe their proposed academic area of study.
- Write well in English.

If the application for admission is accepted, PIL will work with students to identify a University of Minnesota faculty member with expertise in the area of concentration to serve as an area specialist. During the degree planning stage, the area specialist helps students develop an area of concentration and select appropriate learning activities. The area specialist also helps the student plan and execute the major project and helps in assessing readiness to graduate.

II. Degree Planning Stage

The first PIL registration is the Degree Planning Seminar; an evening class offered each semester that guides new students through the process of designing a degree plan.

PIL 3211. Degree Planning—(8 credits)
During this seminar, students design a degree plan—a detailed outline of all completed and future learning activities (courses and projects) they plan to apply to the graduation criteria.

The degree plan must include a clear description of the area of concentration and learning activities (courses and projects) relevant to the study area. Students learn or review the foundations of a liberal arts education, select appropriate activities, and learn how to design independent projects based on prior or new learning. The degree plan must also identify how students intend to fulfill the learning matrix and the reading and writing criteria.

Once the degree plan is approved, it serves as an agreement between the student and PIL, and functions as a blueprint for the implementation of the bachelor's degree program. Students may decide to make changes in the plan by consulting with program advisers.

III. Program Implementation Stage

Upon approval of the degree plan, students are ready to carry out learning activities. These may include completing new independent projects, taking classes through the University or other institutions, or seeking evaluations for projects based on prior knowledge.

Students register in the program for the following types of activities:

PIL 3251. Individualized Study—(4 credits)
Individualized study involves developing, implementing, and having independent projects evaluated, based on either new or prior learning. Students register for PIL 3251 when doing independent work. Students must attend the Individualized Study Seminar, which meets several times during the semester. Students draw up a contract that identifies the activities they plan to complete during the semester.

PIL 3281. Major Project—(8 credits)
The major project, usually the final learning activity of the program implementation stage, demonstrates expertise gained in the area of concentration. Students register for the major project at the end of the program implementation stage. The major project is completed on an independent basis in consultation with advisers, who assist in areas such as project design, research strategy, and writing.

In addition to these registrations, students may also include a number of new courses in their degree plans.

New Courses—New courses selected for the degree program may be taken through the University of Minnesota, including Independent and Distance Learning courses. Students may also choose to take courses from other accredited colleges and universities in the United States or abroad. Other credit-based learning activities may be used in the degree program.

Any University of Minnesota courses included in the program requires separate registration and tuition. Tuition and fees for other credit-based learning activities vary. Students who complete coursework at other institutions must pay the tuition rates of those institutions.

IV. Graduation Stage

After students complete the coursework detailed in the degree plan, attaining the PIL bachelor's degree requires the additional step of completing an extensive record of their undergraduate education, known as the graduation dossier. The dossier is then submitted to a graduation review committee.

PIL 3291. Graduation Preparation—(8 credits)
During the time students register for graduation preparation, they finish their graduation dossiers, demonstrating completion of requirements for a bachelor's degree. The dossier includes an introductory essay demonstrating readiness to graduate, the major project, University of Minnesota transcript, PIL narrative transcript (written evaluations of independent learning), examples of academic work, and degree plan. The area specialist and program staff provides a preliminary review of the dossier to ensure that graduation criteria have been met.

PIL 4299. Graduation Review—(4 credits)
The final PIL registration is for graduation review, which is required after passing preliminary review. Students submit the final version of the dossier to a graduation review committee, which votes on whether to recommend a baccalaureate degree.

Special Information

Use of PIL Credits

The PIL program is not credit-based, but it uses credits to ensure that registrations are recognized within the University system and that students qualify for residency and financial aid requirements. Tuition credits attached to registrations are not the same as conventional coursework credits, i.e., they are not used to measure progress in the program or readiness to graduate, nor are they necessarily transferable to other programs or colleges.

Residency Requirements

PIL students fulfill the University's residency requirement through program registrations, not necessarily through physical presence on campus. Regardless of where they live, all students are expected to make regular campus visits during their programs. Students must attend seminars and establish a pattern of regular visits with advisers on campus. Those few students who are admitted and live beyond commuting distance will make two or three visits to campus each year. The timing and length of campus visits are negotiable.

Bachelor of Applied Science Degrees

In Partnership with Area Community Colleges

Clinical Laboratory Science

B.A.S.

This degree is designed to prepare laboratory scientists and technologists who wish to expand their clinical knowledge and add to their business and supervisory skills. Students develop skills to work as clinical laboratory scientists, technical specialists, laboratory managers or coordinators, and quality control technologists. The clinical laboratory science program is offered in partnership with Minnesota State Colleges and Universities (MnSCU). Clinical laboratory technicians/ medical laboratory technicians (CLT/MLT) can obtain a B.A.S. degree and take the national certification examinations to practice as a clinical laboratory scientist/ medical technologist (CLS/MT). This program provides a strong foundation in the sciences together with rich experiences in the clinical laboratory. The CLS program requires full-time student attendance during daytime classes. Degree requirements include completing four semesters of courses and four to six months of clinical rotation.

Admission Requirements—To be considered for admission to the program, students must have either a CLT or MLT two-year degree. Since CLT/MLT associate degree programs vary, prospective students may need to complete additional liberal education and science courses. These course requirements can be completed at the University of Minnesota using day, evening, or distance learning (online or correspondence) classes. These course requirements must be met before a student is officially admitted to the program.

Degree Requirements

Students must complete a minimum of 122* credits of required and elective courses; 16 in required general education courses, 20-28 in science courses, 6 in professional and technical courses, and 10 in clinical courses.

*Total credits vary depending on transfer school and MLT program.

Required Courses

Biol 1009—General Biology
Biol 4003—Genetics
or GCD 3022—Genetics
Chem 1022—Chemical Principles II
Chem 2301—Organic Chemistry I
Chem 2302—Organic Chemistry II
MedT 4064—Introduction to Clinical Immunohematology
MedT 4065—Introduction to Clinical Immunohematology: Laboratory
MedT 4082—Applied Clinical Chemistry
MedT 4085—Applied Clinical Hematology
MedT 4086—Applied Immunohematology
MedT 4088—Applied Diagnostic Microbiology
MedT 4089—Specialty Rotation
MedT 4100—Virology, Mycology, and Parasitology for Medical Technologists
MedT 4104—Principles of Diagnostic Microbiology I
MedT 4105—Principles of Diagnostic Microbiology II
MedT 4127W—Introduction to Management and Education I
MedT 4251—Hematology I: Basic Techniques
MedT 4252—Hematology II: Morphology and Correlation
MedT 4253—Hemostasis
MedT 4310—Clinical Chemistry I: Lecture
MedT 4311—Clinical Chemistry I: Laboratory
MedT 4320—Clinical Chemistry II: Lecture
MedT 4321—Clinical Chemistry II: Laboratory
MedT 4400—Immunological and Molecular Basis of Laboratory Testing
Phsl 3051—Human Physiology

Construction Management

B.A.S.

This practitioner-oriented degree can enhance a student's professional career in the construction industry by combining structure design and engineering concepts with management and business skills. The degree concentrates on key competencies of science/technology, management, and communication.

Courses in construction management have been created specifically for the degree. In addition, the program draws on the expertise and coursework in architecture, civil engineering, and other University departments.

The construction management program has been designed to equip construction managers with the necessary skills to deliver projects on time, safely, and within budget. The Construction Management Advisory Board, consisting of representatives from the construction industry and faculty and staff from the University and area community colleges, has developed the curriculum and reviewed the program's requirements.

Admission Requirements—To be admitted to the program, students must have completed 45 credits with a cumulative GPA of 2.50 or higher. Admission requirements include:

- One semester of calculus—completed or in progress.
- One semester of physics—completed or in progress.
- One course in "construction plan reading" or equivalent.

Remaining credits of the 45-credit total may be earned through curriculum for the A.S. in construction management at a community college or through related coursework approved by the B.A.S. Admissions Committee at the University of Minnesota.

Degree Requirements

Students must complete the 120 credits required for the degree with a cumulative GPA of at least 2.00.

The interdisciplinary curriculum of the construction management program includes:

- Strong foundation in the mathematics and sciences necessary to work effectively with the design, technological, and engineering aspects of construction projects.
- Specific construction management techniques.
- Elements that comprise construction, design, and problem solving.
- Thorough understanding of construction technology and processes.
- Strong business and management skills for business operations.
- Effective communication and interpersonal skills.

Required Upper Division Courses

*ABus 4101—Accounting and Finance for Managers
*ABus 4103—Marketing and Sales
Arch 4542—Building Energy Systems
Arch 4552—Integrated Design Systems (course approval pending)
Arch 4572—Structural Frames and Building Design/Construction
CE 3202—Surveying and Mapping
CE 4101W—Project Management
CMgt 4011—Construction Documents and Contracts
CMgt 4012—Risk Management, Bonds and Insurance
CMgt 4013—Legal and Ethical Issues in Construction
CMgt 4021—Construction Planning and Scheduling
CMgt 4022—Construction Estimating
CMgt 4030—Construction Safety and Loss Control
CMgt 4040—Preparation of Specifications and Technical Writing for Construction Professionals
CMgt 4051—Construction Materials for Managers
CMgt 4196—Construction Management Internship

Electives

Fifteen credits in upper division construction management courses or selected in consultation with a B.A.S. adviser.

**Check for online availability.*

Construction Management Minor

The minor consists of the following courses, for a total of 19 credits:

CE 4101W—Project Management
CMgt 3001—Introduction to Construction
CMgt 4011—Construction Documents and Contracts
CMgt 4021—Construction Planning and Scheduling
CMgt 4022—Construction Estimating
CMgt 4030—Construction Safety and Loss Control

Electives

Two credits in electives.

Emergency Health Services

B.A.S.

This degree is designed to prepare workers to meet the changing needs of emergency health services. The program will equip students with the education and skills needed to coordinate and direct the delivery of emergency health services in a variety of settings, ranging from out-of-hospital, in-hospital education and leadership, to occupational health and safety units in business and government. This is a partnership degree program from the University of Minnesota and Twin Cities community colleges through the Twin Cities Higher Education Partnership.

Admission Requirements—To be admitted to the program, a candidate must be a current registered nurse currently employed in an emergency medical setting or an EMT-paramedic with current state certification.

Students must also have completed at least 50 semester (or 70 quarter) credits transferable to the program, including biology or chemistry, anatomy, physiology, English composition, and speech with a minimum GPA of 2.50. Contact a B.A.S. adviser for a list of approved courses that can be taken at Twin Cities area community colleges or the University of Minnesota.

Degree Requirements

Students must complete at least 120 credits, including at least 55 credits in the major.

The program's upper division segment requires a core set of courses in the areas of finance and budgeting; leadership and ethics; communication and interpersonal effectiveness; and research. Students must also complete a management or education track; both tracks include a practicum and elective courses.

Required Courses

Complete at least 27 credits of courses from the following:

*ABus 4023—Communicating for Results
*ABus 4031—Accessing and Using Information Effectively
EHS 4011—Concepts of Emergency Health Services
EHS 4021—EMS Planning and Fiscal Management
EHS 5031—Basic Principles of Research
Phil 3305—Medical Ethics
PubH 5170—Introduction to Occupational Health and Safety

Choose one course from:

*ABus 4021, EPsy 5152, HRD 5302, PA 5131

In addition, students must choose a management track or education track of study.

Management Track

Complete at least 25 credits from the following:

*ABus 4101—Accounting and Finance for Managers
*ABus 4104—Management and Human Resources Practices
*ABus 4012—Problem Solving in Complex Organizations
or OMS 3059—Quality Management and Six Sigma
*ABus 4022—Managing Organizational Relationships
or Mgmt 3001—Fundamentals of Management
OMS 3001—Introduction to Operations Management
Practicum in the management track
Choose 3 or more credits of elective courses in consultation with a B.A.S. adviser.

** Check for online availability.*

Education Track

Complete at least 25 credits from the following:

AdEd 5101—Strategies for Teaching Adults
EPsy 5115—Psychology of Adult Learning and Instruction
EdPA 5036—Ethics, Morality, and Values in Education
Choose one course from: EdPA 5021, EdPA 5032, WCFE 5301
Choose one course from: AdEd 5103, HRD 5629, CI 5133
Choose 3 credits from: HRD 5661, CI 5330, CI 5331, CI 5336, or CI 5155
Practicum in education track
Three or more credits of elective courses chosen in consultation with a B.A.S. adviser.

Information Networking

B.A.S.

This degree is an interdisciplinary blend of computer science, management and information systems, engineering, and liberal arts. Students develop skills to become computer network architects or engineers or pursue other professional career tracks related to information networking. The information networking program is offered in partnership with Twin Cities area community colleges such as North Hennepin Community College (NHCC), Brooklyn Park. Approximately 60 credits of lower division requirements can be completed at a community college.

The program was designed by faculty from the University and networking professionals from industry in response to the needs, confirmed by market research, for networking professionals in all areas of business, education, and government.

Admission Requirements—To be considered for admission to the program, students must complete at least 45 lower division credits, transferable to the information networking program. These courses must be completed with a GPA of at least 2.60, and students must have a cumulative GPA of at least 2.60. For more information, please go to the B.A.S. Web site at <www.cce.umn.edu/bas>.

Degree Requirements

Students must complete at least 120 credits required for the degree with a cumulative GPA of at least 2.00.

Required Courses

Required courses for the information networking major come from other programs and departments, such as computer science and electrical and computer engineering. Students must complete the following:

*ABus 4021—Small Group Behavior and Teamwork
*ABus 4023—Communicating for Results (or a technical writing course)
*ABus 4043—Project Management in Practice
Acct 2050—Financial Reporting
Comm 1101—Introduction to Public Speaking
CSci 1901—Structure of Computer Programming I
CSci 1902—Structure of Computer Programming II
CSci 2011—Discrete Structures of Computer Science
CSci 2021—Machine Architecture and Organization
CSci 4061—Introduction to Operating Systems
CSci 4081W—Introduction to Software Engineering
CSci 4211—Data Communications and Computer Networks
Econ 1101—Principles of Microeconomics
or Econ 1102—Principles of Macroeconomics
EE 3005—Fundamentals of Electrical Engineering
EE 3006—Fundamentals of Electrical Engineering Laboratory
EngC 1011—University Writing and Critical Reading
IDSc 4102—Introduction to Information System Analysis
IDSc 4153—Telecommunications: Domestic and International Policy and Regulation
INet 4011—Network Administration
INet 4021—Network Programming
INet 4041—Emerging Network Technologies and Applications
Math 1271—Calculus I
Math 1272—Calculus II
Math 2243—Linear Algebra and Differential Equations
Phys 1301—Introductory Physics for Science and Engineering I
Phys 1302—Introductory Physics for Science and Engineering II
Psy 1001—Introduction to Psychology
Stat 3011—Introduction to Statistical Analysis

**Check for online availability.*

The College of Continuing Education collaborates with other colleges at the University of Minnesota, community colleges, and other institutions, as well as business and industry, to offer diverse programs and services.

Electives

Students take 6 credits in upper division courses from ABus, CSci, EE, IDSc, or INet.

Final Project

Students are encouraged to complete an internship during their final year in the program.

Information Technology Infrastructure

B.A.S.

This degree is an interdisciplinary blend of information technology infrastructure, math, science, and business curricula. Students may choose a network, system administration, or database concentration area. Students develop skills to design, construct, and manage technology operations. (This major will eventually replace the B.A.S. majors in information networking and network administration.)

The program was designed by faculty from the University and information technology professionals from industry in response to the needs, confirmed by market research, for information technology professionals in all areas of business, education, and government.

Admission Requirements—To be considered for admission to the program, students must complete at least 45 lower division credits, transferable to the information technology infrastructure program. These courses must be completed with a GPA of at least 2.60, and students must have a cumulative GPA of at least 2.60. For more information, please go to the B.A.S. Web site at <www.cce.umn.edu/bas>.

Degree Requirements

The curriculum contains lower and upper division courses in three broad areas: general education, business, and technical. In total there are 125 credits of required and elective courses; 33 in required general education courses, 34 in core program courses, and 58 credits in required technical courses.

Three areas of specialization are defined: networking, system administration, and database administration.

Required Courses

*ABus 4021—Small Group Behavior and Teamwork
*ABus 4023—Communicating for Results
ABus 4032—Quantitative Skills for Decision Making
*ABus 4041—Leadership in a Global and Diverse Workplace
*ABus 4043—Project Management in Practice
*ABus 4102—Operations in Manufacturing and Service Businesses
Acct 2050—Introduction to Financial Reporting
CSci 1103—Introduction to Computer Programming in Java
CSci 1901—Structure of Computer Programming I
CSci 1902—Structure of Computer Programming II
CSci 2011—Discrete Structures of Computer Science
CSci 2021—Machine Architecture and Organization
CSci 4061—Introduction to Operating Systems
CSci 4081W—Introduction to Software Engineering
CSci 4211—Introduction to Computer Networks
or CSci 5211—Data Communications and Computer Networks
Econ 1101—Principles of Microeconomics
or Econ 1102—Principles of Macroeconomics
EngC 1011—University Writing and Critical Reading
GC 1511—Introduction to Business and Society
INet 4051—I.T. Infrastructure Operations
Math 1142—Short Calculus
or Math 1271—Calculus I
Phys 1101W—Introductory College Physics I
Phys 1102W—Introductory College Physics II
Rhet 3562W—Technical and Professional Writing
Spch 1101—Introduction to Pubic Speaking
or Rhet 1223—Oral Presentations in Professional Settings
or Spch 3402—Introduction to Interpersonal Communication
or Spch 3411—Introduction to Small Group Communication
or GC 1464—Group Process and Discussion in a Multicultural Society
Stat 3011—Introduction to Statistical Analysis
or GC 1454—Statistics
or OMS 1550—Business Statistics: Data Sources, Presentation, and Analysis
WCFE 3011W—Introduction to Technology and Public Ethics
or IDSc 4153—Telecommunications: Domestic and International Policy and Regulation
Three courses in information networking, computer science, information decision sciences, or applied business
One course in psychology, sociology, or history
Two courses in humanities, literature, philosophy, music, theatre, or art
**Check for online availability.*

Specializations

Students must take 6 credits in one of the following specializations.

Networking Specialization

INet 4011—Network Administration
INet 4021—Network Programming
INet 4041—Emerging Network Technologies and Applications
INet 4193—Directed Study

System Administration Specialization

INet 4011—Network Administration
INet 4021—Network Programming
INet 4031—System Administration
INet 4041—Emerging Network Technologies and Applications
INet 4193—Directed Study

Database Administration Specialization

INet 4031—System Administration
IDSc 4103—Database Design, Manipulation, and Management
IDSc 4131—Advanced Database Design and Administration
IDSc 4431—Advanced Database Design
IDSc 4432—Advanced Database Management and Administration

Manufacturing Technology

B.A.S.

This is a new degree designed for students working in, or planning to enter, careers in manufacturing. The program provides students with knowledge and skills in the areas of manufacturing systems and processes, computer technology, quality, operations, project management, business and finance, and interpersonal skills including, communications, leadership, teamwork, and diversity. Students are prepared to work as project managers, process engineers, materials managers, lead technicians, order process analysts, facilities engineers, and business analysts.

The degree in manufacturing technology (MT) was designed with manufacturers to meet the needs of their industries in a competitive global economy. It is offered in Rochester in partnership with the University of Minnesota—Rochester, Rochester Community and Technical College (RCTC), and Winona State University—Rochester Center. The B.A.S. in manufacturing technology is offered in the Twin Cities in partnership with MnSCU.

Admission Requirements—To be considered for admission to the program, students must complete at least 45 lower division credits, transferable to the manufacturing technology program. These courses must be completed with a GPA of at least 2.60, and students must have a cumulative GPA of at least 2.60. For more information, please go to the B.A.S. Web site at <www.cce.umn.edu/bas>.

Degree Requirements

The curriculum contains lower and upper division courses in three broad areas: general education, business, and technical. In total there are 124 credits of required and elective courses; 33 in required general education courses, 87 in MT core program courses, and 4 in professional required courses.

Required Courses

The lower division curriculum is provided by Rochester and Twin Cities metro area community and technical colleges. For more information, please go to the B.A.S. Web site at <www.cce.umn.edu/bas>.

*ABus 4022—Managing Organizational Relationships
*ABus 4023—Communicating for Results
*ABus 4041—Leadership in a Global and Diverse Workplace
*ABus 4043—Project Management in Practice
*ABus 4102—Operations in Manufacturing and Service Businesses
MT 4001—Manufacturing Cost Accounting, Analysis, and Control
MT 4011—Design of Manufacturing Systems and Simulation
MT 4012—Manufacturing Processes
MT 4015—Quality Engineering
MT 4021—Properties of Materials
MT 4025—Computer Integrated Manufacturing
MT 4031—Engineering Materials Processing I
MT 4032—Engineering Materials Processing II
MT 4041—Fluid Mechanics
MT 4042—Manufacturing Automation
MT 4102—Machine Control
MT 4105—Machine Tool Design
MT 4201—Statistical Process Control
MT 4301—Design and Analysis of Experiments
MT 4501—Manufacturing Product/System Design I
MT 4511—Manufacturing Product/System Design II

**Check for online availability.*

Network Administration

B.A.S.

This degree is designed to educate students in business and networking technology so they can function in both environments. Students learn to make business decisions with an understanding of their technical implications and technical decisions with an understanding of their business purposes and needs. The degree program enables students to develop both practical technical skills useful in entry level positions and a broad high level understanding of computer networking and business information systems. The network administration program is offered in partnership with area community colleges such as Inver Hills Community College (IHCC), Inver Grove Heights. Approximately 60 credits of lower division coursework can be completed at a community college.

Admission Requirements—To be considered for admission to the program, students must complete at least 45 lower division credits, transferable to the network administration program. These courses must be completed with a GPA of at least 2.60, and students must have a cumulative GPA of at least 2.60. For more information, please go to the B.A.S. Web site at <www.cce.umn.edu/bas>.

Degree Requirements

The curriculum contains lower and upper division courses in three broad areas: general education, business, and technical. Students must complete the 120 credits required for the degree with a cumulative GPA of at least 2.00.

Required Courses

*ABus 4021—Small Group Behavior and Teamwork
*ABus 4023—Communicating for Results
ABus 4032—Quantitative Skills for Decision Making
*ABus 4041—Leadership in a Global and Diverse Workplace
*ABus 4043—Project Management in Practice
Acct 2050—Introduction to Financial Reporting
BLaw 3058—The Legal Environment of Business
Comm 3402—Introduction to Interpersonal Communication
CSci 1103—Introduction to Computer Programming in Java
or a java programming course from a partner community college
CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers
CSci 2021—Machine Architecture and Organization.
CSci 4041—Algorithms and Data Structures
CSci 4061—Introduction to Operating Systems
CSci 4211—Data Communications and Computer Networks
Econ 1101—Microeconomics
Econ 1102—Macroeconomics
EngC 1011—University Writing and Critical Reading
IDSc 3001—Information Systems for Business Process Management
IDSc 4102—Introduction to Information Systems Analysis
IDSc 4151—Data Communications Systems
IDSc 4153—Telecommunications: Domestic and International Policy and Regulation
INet 4011—Network Administration
INet 4021—Network Programming
INet 4051—Capstone: I.T. Infrastructure Operations
Math 1142—Short Calculus
Phil 1001—Introduction to Logic
Phys 1101W—Introductory College Physics I
Phys 1102—Introductory College Physics I
Rhet 3562—Technical and Professional Writing
Stat 1001—Introduction to the Ideas of Statistics
WCFE 3011W—Introduction to Technology and Public Ethics

Introduction to networking course (only available at partner community colleges)
One course in humanities, music, theatre, art, or literature taken at either location
One course in sociology or psychology taken at either location
** Check for online availability.*

Specialization

Students must complete 6 credits from a list of courses in networking, software engineering, or database design and management. See a B.A.S. adviser for a list of acceptable courses.

Radiation Therapy

B.A.S.

The radiation therapy program is designed to prepare individuals for a career in radiation therapy focusing on the changing demands of new technologies and advancements in treatment techniques. This full-time program of study prepares professionals to deliver quality radiation therapy treatment that helps diagnose and treat various health problems in a variety of settings ranging from a university environment to a freestanding radiation oncology practice. Graduates gain the education and experience for dosimetry (treatment planning) and/or management roles.

The degree program in radiation therapy is a partnership between the University of Minnesota and the Fairview-University Medical Center. The degree requires the completion of 120 credits. It is open to both non-radiographers and radiographers.

Admission Requirements—To be considered for admission to the program, students must complete all preprofessional/nonradiation therapy courses with a cumulative GPA of at least 2.50. Students must meet the required essential or physical requirements and CPR requirements for the program. A criminal background check is required. Students must meet the immunization standard for Fairview-University Medical Center. Students are admitted to the program fall semester only.

Degree Requirements

Students must complete the 120 credits required for the degree, including 72 in nonradiation therapy courses and 48 in radiation therapy courses. Students must earn a cumulative GPA of at least 2.00.

Required Courses

Biol 1009—General Biology
Chem 1011—General Principles of Chemistry
Comm 1101—Introduction to Public Speaking
EngC 1011—University Writing and Critical Reading
GC 1135—Human Anatomy and Physiology
GC 1571—Introduction to Microcomputer Applications (waiver available)
Math 1031—College Algebra and Probability
Phar 1002—Health Sciences Terminology
or Phar 5201—Health Sciences Applied Terminology
Phil 1003W—Introduction to Ethics
Phys 1101W—Introductory College Physics I
Psy 1001—Introduction to Psychology
or Soc 1001—Introduction to Sociology
RTT 3001—Introduction to Radiation Therapy
RTT 3100—Mathematics
RTT 3110—Basic Physics
RTT 3120—Radiation Physics I
RTT 3121—Radiation Physics II
RTT 3122—Advanced Dosimetry
RTT 3130—Principles of Oncology I
RTT 3131—Principles of Oncology II
RTT 3132—Medical Oncology
RTT 3140—Radiation Biology/Hyperthermia
RTT 3150—Brachytherapy
RTT 3160—Methods of Patient Care
RTT 3171—Clinical Radiation I
RTT 3172—Clinical Radiation II
RTT 3173—Clinical Radiation III
RTT 3174—Clinical Radiation IV

Guided Electives

Students take credits in upper division courses from physics or math (7-8 cr) and business/management or a related field (12 cr).

Dental Hygiene

This is the Dental Hygiene section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Degree Program

Dental Hygiene

General Information

The School of Dentistry's mission is to educate dental and dental hygiene professionals; discover new knowledge, technology, and skills; and apply those discoveries to the dental and dental hygiene professions and the communities that they serve.

The School of Dentistry celebrated its centennial in 1988. In its long history, the school has developed an international reputation for education, research, and service. The School of Dentistry's professional program in dental hygiene, established in 1919, has an illustrious record of accomplishment and innovation and is one of the country's premiere programs. It is fully accredited by the Commission on Dental Accreditation and is the only dental hygiene program in Minnesota that grants a baccalaureate degree and is affiliated with a school of dentistry.

Dental hygienists are preventive oral health professionals who have graduated from an accredited dental hygiene program in an institution of higher education and are licensed by states to practice dental hygiene. They provide educational, clinical, research, administrative, consumer advocacy, change agent, and therapeutic services supporting total health through the promotion of optimal oral health.

Dental hygienists practice in settings such as private dental offices and clinics; federal, state, and local health departments or associated institutions; hospitals and long-term care facilities; school districts or departments of education; educational programs for dental, dental hygiene, and dental assisting students; private business or industry; correctional facilities; private and public centers for pediatric, geriatric, and other groups or individuals with special needs; and health maintenance organizations.

The dental hygiene curriculum seeks to train students in a variety of dental hygiene roles and health care settings.

The program emphasizes a strong commitment to community outreach and service, and to intellectual development and critical thinking. Graduates complete a baccalaureate degree that blends a solid dental hygiene education with the biological, behavioral, and social sciences, and the liberal arts.

The Division of Dental Hygiene also offers a baccalaureate degree completion program for graduates of accredited associate degree programs in dental hygiene who wish to earn a baccalaureate degree.

Admission

The Division of Dental Hygiene sets its standards and requirements for admission. A strong interest in the natural sciences, and the social and behavioral sciences is required. The division recommends that applicants have a genuine interest in human services and promoting public health and welfare.

The dental hygiene curriculum consists of the preprofessional program in CLA or its equivalent at another regionally accredited institution and the professional program in the School of Dentistry, Division of Dental Hygiene.

Admission to the preprofessional program requires the student to meet the admissions criteria of individual colleges within the University and is subject to CLA's academic regulations or their equivalent at another institution. Admission to the preprofessional program does not guarantee admission to the professional program.

Admission to the professional program is competitive and occurs once a year for fall semester entry. Applications are accepted from December 1 of the desired year of entry until February 1. Applications received after the deadline are considered for the alternate list only.

Requirements for application include: high school graduate; ACT, PSAT, or SAT scores; transcripts of all high school and college courses; minimum 2.00 GPA (cumulative, preprofessional, and science coursework); and evidence of plans for completion of specified preprofessional coursework before proposed entry. Documentation indicating completion of all required preprofessional courses must be submitted to the Division of Dental Hygiene by August 15 of year of proposed entry.

Applicants must complete the University of Minnesota's high school preparation requirements prior to entry into the professional program. See Freshman Admission in the General Information section of this catalog.

The University's liberal education requirements must be completed prior to graduation from the program. If not completed prior to entry into the program, these requirements must be completed during summers while enrolled in the program.

Students enrolled at the University apply by submitting an *Application for Change of College* form to the University's Office of Admissions. Students attending other regionally accredited colleges and universities apply by submitting the *Application for Undergraduate Admission* at <http://admissions.tc.umn.edu> on the Web or from the Office of Admissions. Application forms and change of college forms are available from the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S. E., Minneapolis, MN 55455, or call 612-625-2008.

The Division of Dental Hygiene requires all applicants who are not native speakers of English to submit written evidence of either a Test of English as a Foreign Language (TOEFL) score or a Michigan English Language Assessment Battery (MELAB) score. A TOEFL score of at least 550 (213 on the computer-based exam) or a MELAB score of at least 80 is required. The TOEFL/MELAB must be administered within two years before the date of application to the Division of Dental Hygiene.

To register for the TOEFL, contact the agency that handles TOEFL registration in your country or write to the Educational Testing Service (Box 899, Princeton, NJ 08541) at least 10 weeks before any scheduled test date. If you live in the Twin Cities area, you may register for the MELAB with the Minnesota English Center, 320 16th Avenue S.E., University of Minnesota, Minneapolis, MN

One hundred percent of the 2001 dental hygiene graduates found employment as dental hygienists within two weeks of graduation.

The dental hygiene program is the only program in Minnesota that grants a baccalaureate degree and is affiliated with a school of dentistry.

55455, or call 612-624-1503. To register for the MELAB outside the Twin Cities area, contact the English Language Institute, Testing and Certification Division, University of Michigan, Ann Arbor, MI 48109, or call 313-764-2416.

Students admitted to the Division of Dental Hygiene and who require accommodation for a disability should contact the Office of Disability Services at 612-626-7379 before the beginning of the semester of entry into the program.

Degrees

The School of Dentistry Division of Dental Hygiene offers two program tracks leading to a bachelor of science degree in dental hygiene.

The B.S. degree program track is designed for entry-level students; the B.S. degree-completion program track is tailored to students who have completed an associate degree program in dental hygiene at a regionally accredited institution and who want to earn a baccalaureate degree.

Policies

Students who have been admitted to the program must submit documentation of immunizations required by the University and are strongly encouraged to have completed a physical assessment examination. Students must provide evidence of completion of a Hepatitis B vaccination during the first semester in the program.

The American Dental Association Commission on Dental Accreditation requires that all students be able to perform basic life support procedures, including cardiopulmonary resuscitation, and manage other medical emergencies. In compliance with this standard, students are required to take an American Heart Association Basic Life Support Training Course provided by the University of Minnesota Life Support Program and scheduled during the sophomore and senior year orientation sessions.

Applicants to the program need to be aware of the following Minnesota Dental Practice Act HIV and HbV Prevention Policy that affects applicants/students who are HIV and/or HbV positive. The Practice Act stipulates that:

- A licensed dental hygienist who is diagnosed as infected with HIV and/or HbV must report that information to the Commissioner of Health promptly and as soon as medically necessary for disease control purposes, but no later than 30 days after learning of the diagnosis or 30 days after becoming licensed in the state.
- The Minnesota Board of Dentistry may refuse to grant a license or may impose disciplinary or restrictive action against an HIV/HbV infected dental hygienist who fails to comply with any of the requirements of the Board or with any monitoring or reporting requirement.
- After receiving a report that a regulated person is infected with HIV and/or HbV, the Board of Dentistry or the Commissioner of health shall establish a monitoring plan for the infected dental hygienist. This plan may address the scope of practice of the individual, required submission of reports and other provisions that the Board deems reasonable.

Students in the professional program are subject to the regulations established by the Division of Dental Hygiene and must maintain satisfactory academic process.

Satisfactory performance is considered to be not only a passing level in scientific and clinical skills together with theoretical knowledge, but also ethical integrity and honesty.

Students not achieving satisfactory progress may be placed on scholastic probation upon recommendation of the Student Scholastic Standing Committee. Students' work is considered unsatisfactory when they earn less than a C- grade average (1.67 grade points for each credit) for any course in a given year or semester. If students achieve an unsatisfactory grade in a course, remedial work in the course may be provided, if possible; if not, students must repeat the course the next time it is offered. Unsatisfactory grades in two or more courses are sufficient basis for dismissal.

Dental hygiene students must undergo a criminal background study (Criminal Background Study Under State Law, Minnesota Vulnerable Adult Act, as amended 1995 and 1996), in order to have direct contact with patients and residents in hospitals, extended care facilities, and other health care facilities licensed by the Minnesota Department of Health. Failure to pass this background study is grounds for dismissal from the program.

Graduation Requirements

The bachelor's degree will be recommended for students who have been formally admitted to the entry-level or the degree-completion program, who earn a minimum GPA of 2.00, and have completed all of the required work and the total number of credits specified for the curriculum.

Students with a minimum GPA of 3.75 in upper division courses are granted their degree "with distinction." Students with a minimum GPA of 3.90 in upper division courses are granted their degree "with high distinction."

Licensure and Placement

Graduates are eligible for licensure after successfully completing a written National Board Dental Hygiene Examination and a clinical examination, both of which are given on the University's Minneapolis campus. The licensed dental hygienist practices in accordance with the requirements of individual state dental practice acts. In many states, a dental hygienist must participate in continuing education courses for license renewal.

The School of Dentistry provides placement assistance to dental hygiene graduates through the Minnesota Dental Placement Service at 612-626-0171.

Advising

The Division of Dental Hygiene offers advising services to students currently enrolled or interested in dental hygiene. Group advising sessions are held the first Tuesday of each month, on an appointment basis. To schedule an appointment with a dental hygiene academic adviser, call 612-625-9121 or write 9-436

Malcolm Moos Health Sciences Tower,
515 Delaware Street S. E., Minneapolis, MN 55455; fax 612-625-1605, or e-mail thomp034@umn.edu.

The Division of Dental Hygiene provides a student support program to enhance the success of its students. Student performance is monitored and academic assistance is provided through tutoring and consultation. Counseling and advising are available through the division, University Counseling & Consulting Services, and faculty of the student's choosing.

Special Learning Opportunities and Resources

Community Outreach Clinics—Dental hygiene students participate in a number of off-campus Twin Cities and out-state Minnesota week-long community clinics providing dental hygiene care to populations who typically do not have sufficient access to dental care.

Jamaica Dental Mission—This program was initiated in 1986 in response to a report that cited Jamaicans as having one of the highest rates of dental caries and periodontal diseases in the world due to a diet very high in sugar, an unfluoridated water supply, and a severe shortage of dental and dental hygiene professionals.

Each year, selected students raise funds to cover the expense of sending faculty, dental hygiene and dental students, and supplies to the island to educate and treat patients seeking care. A wide range of preventive and restorative care is provided.

While conditions are primitive, this ten-day mission provides students with some unique life and real-world experiences.

Migradent—Each year, about 5,000 children accompany 20,000 seasonal agricultural workers who come to Minnesota during the summer months. The migratory nature of this population makes access to dental services extremely difficult.

In 1996, Migradent '96 was initiated to bring dental care to migrant children in western Minnesota. These children have dental caries rates nearly three times that of mainstream American children. Migradent continues as a summer project for selected dental hygiene and dental students, faculty, and staff providing diagnostic, preventive, and restorative services for several hundred children.

Summer Research Fellowships—The School of Dentistry Summer Research Fellowship Program provides research experiences for exceptional dental hygiene and dental students with an interest in research careers and postgraduate research training.

Sophomore and junior dental hygiene students are invited to apply for research fellowship positions in the spring of each year. If selected, they are assigned to work with a faculty mentor for the summer. During a ten-week period, students collect and analyze data, undertake a structured research project, and prepare a formal report. Research fellows attend a weekly research training seminar where they learn research methods. They also evaluate selected journal articles and review abstracts and oral presentations of former trainees. About 20 students receive stipends each summer.

Continuing Dental Hygiene Education—Students are encouraged to participate in selected continuing education courses during their senior year on a space-available basis. These courses expose seniors to a broad scope of information and technology from a variety of local and national speakers. Students gain by selecting their own educational experiences and interacting with practicing dental hygienists and dentists.

Union Gospel Mission—Two evenings each week, School of Dentistry dental hygiene and dental student and staff volunteers provide dental hygiene and dental care for the lower-income and homeless population in St. Paul's inner city.

International Programs

Dental hygiene encourages students to participate in an international study experience as part of their degree program. See Study Abroad in the General Information section of this catalog.

Scholarships and Awards

Several scholarships and awards are presented annually by division faculty to selected dental hygiene students. For more information, call 612-625-9121.

Student Organizations

School of Dentistry Student Council—Each year dental hygiene and dental students elect the School of Dentistry Council of Students, which discusses matters of mutual interest with faculty advisers and promotes many projects and activities.

Student Affairs Committee—This committee is composed of dental hygiene and dental students and faculty members and is responsible for students' concerns such as membership in local and national organizations, ethics, counseling, tutorial assistance, questions on educational programs, financial aid, publications, housing, and alumni relations.

Student American Dental Hygienists' Association—Dental hygiene students participate in the student chapter of the national association, which represents concerns and issues related to the dental hygiene profession. Membership fees entitle students to various journals and special services.

Council for Health Interdisciplinary Participation (CHIP)—Dental hygiene students are encouraged to participate in the activities of the Academic Health Center CHIP.

Initiated in 1919, the dental hygiene program at the University of Minnesota was the fourth in the nation.

Directory

(area code 612)

Administrative Offices

Office of the Director
Kathleen J. Newell, R.D.H., Ph.D.
Director and associate professor
9-436 Malcolm Moos Health Sciences Tower
515 Delaware St. S.E.
Minneapolis, MN 55455
625-9121
Fax: 625-1605
E-mail: newel001@tc.umn.edu

Student Services and Advising
Karen Smith, Admissions Secretary
9-436 Malcolm Moos Health Sciences Tower
515 Delaware St. S.E.
Minneapolis, MN 55455
625-9121
Fax: 625-1605
E-mail: smith093@tc.umn.edu

School of Dentistry Web Page
<www.dentistry.umn.edu>

Dental Hygiene

Degree Program

Dental Hygiene

Department of Preventive Sciences

B.S.

Two program tracks are available, both leading to a B.S. degree in dental hygiene:

- B.S. degree program, for entry-level students
- B.S. degree-completion program, for students who have completed an associate degree program in dental hygiene at a regionally accredited institution and who want to earn a baccalaureate degree

The program blends a solid dental hygiene education with study of the biological, behavioral, and social sciences, and the liberal arts.

Degree Requirements

Students must complete at least 120 credits to graduate.

The two program tracks include two separate sets of major credit requirements, as follows:

- Students in the B.S. degree program for entry-level students must complete at least 85 credits in the major.
- Students in the B.S. degree-completion program must complete at least 30 credits in the major. Students must also complete at least 50 upper division credits. Based on petition and determined by the Dental Hygiene Curriculum Committee, up to 20 credits from the associate degree program may be accepted as upper division credits.

Students in this program must complete at least 30 semester credits in residency at the University of Minnesota.

B.S. Degree Program

Required Courses

Students in the B.S. degree program for entry-level students must complete the following requirements:

- Preprofessional program in CLA or its equivalent at some other regionally accredited institution (32 cr)

  Requirements include courses in anatomy, biology, chemistry, composition, nutrition, psychology, sociology, speech, and statistics. Lists of specific courses are available from the School of Dentistry's Division of Dental Hygiene.
- Liberal education requirements for a B.S. degree (20-30 cr)

  Students may fulfill some of the University's liberal education requirements with courses in the preprofessional or professional programs.
- Professional program in the School of Dentistry's Division of Dental Hygiene (85 cr), including the following courses:

DH 2111—Dental Anatomy
DH 2121—The Dental Hygiene Care Process: Clinical Application I
DH 2132—Head and Neck Anatomy
DH 2211—Oral Histology and Embryology
DH 2212—Dental Hygienist-Patient Relationship
DH 2221—Periodontology
DH 2222—The Dental Hygiene Care Process: Clinical Application II
DH 2231—Cariology
DH 2235—Oral and Maxillofacial Radiology
DH 3111—Biomaterials for the Dental Hygienist
DH 3112—General and Oral Pathology
DH 3123—The Dental Hygiene Care Process: Clinical Application III
DH 3126—Oral and Maxillofacial Radiology: Clinic I
DH 3131—Periodontology I Lecture
DH 3132—Applied Nutrition in Dental Hygiene Care
DH 3133—Pharmacology
DH 3134—Dental Hygiene Care for Special Needs Patients: I
DH 3135—Oral and Maxillofacial Radiology: Theory, Principles and Radiographic Analysis
DH 3221—Local Anesthesia and Pain Management
DH 3224W—The Dental Hygiene Care Process: Clinical Application IV
DH 3227—Oral and Maxillofacial Radiology: Clinic II
DH 3231W—Research Methods in Dental Hygiene
DH 3235—Dental Hygiene Care for Special Needs Patients: II
DH 4125W—The Dental Hygiene Care Process: Clinical Application V
DH 4128—Oral and Maxillofacial Radiology: Clinic III
DH 4131—Epidemiology, Prevention, Dental Public Health, and Community Outreach
DH 4132W—Ethics, Jurisprudence, and Principles of Practice
DH 4137—Patient Management IV (PCG)
DH 4226—The Dental Hygiene Care Process: Clinical Application VI
DH 4229—Oral and Maxillofacial Radiology: Clinic IV
DH 4231—Periodontology III Lecture
DH 4232—Community Outreach
DH 4233—Legislative, Social, Economic, and Practice Factors in Oral Health
DH 4238—Patient Management IV (PCG)
BioC 1001—Elementary Biochemistry
MicB 4001—Microorganisms and Disease
PubH 3001—Personal and Community Health
Phsl 3051—Human Physiology

Electives

DH 2191, 3191, and 4191—Independent Study
DH 4227 and 4228—Advance Dental Hygiene Clinical Experience I and II
DH 4250—Community Outreach

B.S. Degree Completion Program

Students in the B.S. degree-completion program must fulfill the following requirements:

- Associate degree program in dental hygiene at an accredited institution (about 60-74 semester credits)
- University liberal education requirements for a B.S. degree (20-30 cr)
- Electives approved by adviser, as needed to fulfill the 120-credit requirement
- Core dental hygiene curriculum (at least 30 cr), as follows:

DH 3131—Periodontology I Lecture
DH 3231W—Research Methods in Dental Hygiene
DH 4231—Periodontology III Lecture
DH 4292—Educational Philosophy and Program Planning
DH 4293—Directed Study
DH 4294—Directed Research
DH 4295—Information Technology
DH 4296—Special Topics
DH 4297—Topics in Interdisciplinary Health Care
DH 4298—Dental Hygiene Process of Care: Clinical Application
DH 4299—Selected Topics in Patient Education
DH 4300—Field/Practice Externship
Stat 1001—Introduction to the Ideas of Statistics

College of Education and Human Development

This is the College of Education and Human Development section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Degree Programs, Minors, and Certificates

College of Education and Human Development

General Information

The College of Education and Human Development (CEHD) consists of six departments: Institute of Child Development; curriculum and instruction; educational policy and administration; educational psychology; kinesiology; and work, community, and family education. Classrooms, offices, computer labs, and more than 20 research and service centers occupy several buildings on the Minneapolis and St. Paul campuses. Founded in 1905, the college has about 700 undergraduate students, 2,500 graduate students, and 122 faculty.

CEHD's mission is to generate and apply knowledge about teaching, learning, and human development and to improve education for all individuals. A distinguishing feature of the college is the breadth, depth, and careful integration of its core disciplines and fields of study. Another is the college's strong commitment to community outreach as well as intellectual development. This extensive network of community ties facilitates both the transfer of knowledge to practice and the incorporation of community viewpoints into the college's teaching and research missions. The college seeks to prepare students to meet the challenges of teaching and leading in increasingly culturally diverse classrooms, schools, and society.

The roles and requirements of educators and human development professionals have expanded dramatically in the past decade. Administrators, practitioners, and researchers must develop a new breadth and depth of knowledge. To meet the complex needs of 21st-century learners, colleges must prepare educational leaders who will shape policies, define agendas, and initiate fundamental change. Consistently ranked as one of the most productive professional schools of education in the country—public or private—the college is a state, national, and international leader in teaching, research, and outreach. Several of the college's academic units are ranked in the top five nationally and its graduate programs place the college as one of the University's leading academic units in conferring graduate degrees.

Admission

Students wishing to complete a CEHD major begin a course of study in a freshman-admitting college and transfer to CEHD after one or two years of specified courses, depending on their desired major.

CEHD admission criteria vary by program. Criteria may include prerequisite courses, grade point average (GPA), total credits, and experience related to the proposed career.

Prospective students are strongly encouraged to attend an information group meeting or meet with an adviser before applying. For more information, contact the college's office of Student & Professional Services (SPS), 110 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-6501).

Procedures

Applying to undergraduate programs at the College of Education and Human Development (CEHD) requires submission of separate sets of application materials to the University of Minnesota and to CEHD.

Applicants must submit the following items:

University Application—Students who have not been admitted to a degree program at any University of Minnesota campus must complete the University's undergraduate application. The form is available from the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Dr. S.E., Minneapolis, MN 55455-0213 (612-625-2008 or 800-752-1000) or on the Web at <http://admissions.tc.umn.edu>. Contact the admissions office for application deadlines; submit the completed application to the admissions office.

Students who have previously been admitted to any University of Minnesota campus and college must complete the *Application for Undergraduate Change of College* ***or*** the *Application for Admission to Second Undergraduate Degree Program*. These forms are available from the One Stop Student Services Center, 200 Fraser Hall, 106 Pleasant St. S.E., Minneapolis, MN 55455 (612-625-5333) or on the Web at <www.onestop.umn.edu/Forms/>. Contact the registrar's office for application deadlines; submit the completed application to the One Stop Student Services Center.

CEHD Application—Applicants must submit the completed *Application Materials* form for individual degree programs to the college's office of Student & Professional Services (SPS) (110 Wulling Hall, 86 Pleasant St. S.E., Minneapolis, MN 55455; 612-625-6501; fax: 612-626-1580) by the deadlines listed below. Application forms are available at SPS or can be downloaded from the Web at <www.education.umn.edu/SPS/Forms/>. Required application materials vary by program.

Application Deadlines—Most CEHD undergraduate programs admit students twice a year according to the schedule below. CEHD application materials are due by these deadlines:

- March 1 for fall term admission
- October 1 for spring term admission.

The sport studies program admits students only once per year; application deadline for fall term admission is March 1.

Programs of Study

CEHD is a professional school focused on both undergraduate and advanced study, offering programs in a wide range of education and human development disciplines. Students can prepare for careers in government, business, and community settings as well as formal or informal education settings. Programs of study include bachelor of science (B.S.) degrees, minors, certificates, master of education (M.Ed.)/initial teacher licensure, (M.Ed.)/professional studies, and licensure endorsement. The University's Graduate School offers the

The college's Institute of Child Development (ICD) is in the midst of its 26th year of a longitudinal study of the effects of poverty on parenting.

master of arts (M.A.), specialist certificate, doctor of education (Ed.D.), and doctor of philosophy (Ph.D.) in education and human development.

Undergraduate programs are described below. For information about other programs, see the college's *Professional Studies Catalog* or the *Graduate School Catalog*.

Bachelor of Science (B.S.)

The college's undergraduate majors prepare students for careers as educators and human development professionals in varied settings. All University of Minnesota students, whatever their declared major, may complement their degree programs by taking a variety of elective courses available in all six CEHD departments.

Agricultural Education—Prepare to teach agriculture-related subjects to grades 5-12 or adults by specializing in either agricultural science and technology or natural and managed environmental education. Also, prepare to work in agricultural industry and business settings by specializing in agricultural leadership, training, and development.

Business and Industry Education: Career and Technology Education—Prepare to teach career and technical education in technical colleges or high schools.

Child Psychology—See College of Liberal Arts section.

Foundations of Education (FOE): Early Childhood—This program prepares upper division (typically junior or senior status) students to work with young children and their families, and to work with both typically and atypically developing children. With an extensive core of liberal education courses that are central to early childhood teaching and child development, the program prepares graduates to move into non-licensed educational settings (including day-care centers or youth community programs), or pursue advanced degrees. The program also prepares students for entry into the master of education (M.Ed.)/initial licensure program in early childhood and early childhood special education.

Foundations of Education (FOE): Elementary—Work as an educator or human services professional in an informal setting or prepare for elementary teacher licensure. When students complete the B.S., they can go on to complete licensure with only two to three additional semesters at the master's level.

Human Resource Development—Prepare for human resource development positions in business, training and development, quality improvement, career development, employee assistance, or other areas. Students also can prepare for graduate study in this field.

Kinesiology—Pursue a career in fitness/wellness, human performance, and health programs or prepare for teacher licensure at the master's level in physical education. Students also can prepare for professional degrees in the health sciences, including physical or occupational therapy, medicine, and nursing.

Music Education—See College of Liberal Arts (CLA) section.

Recreation, Park, and Leisure Studies—Prepare for leadership, supervisory, or administrative positions in recreation, park, and leisure services agencies. Students can specialize in leisure services management or therapeutic recreation.

Sport Studies—This major focuses on contemporary sport as a product of social, psychological, and economic phenomena. Choose an emphasis in coaching, pre-sport management, or youth services/development.

Technology Education—This program prepares students who want to teach in public schools for state teaching licensure in technology education for grades 5-12.

Minors

Two minors are available: coaching and leadership. The coaching minor is available to students admitted to a B.S. degree program in the college's School of Kinesiology. For more information, call 612-625-5300. The undergraduate leadership minor is open to students who have completed EdPA 1301/PA 1961 with a grade of at least S (or C- or better). For more information, call the Office for Student Affairs at 612-625-6531.

Policies and Procedures

S-N Grading—CEHD strictly limits the use of S-N grading. All major coursework in an undergraduate program must be taken A-F unless otherwise indicated. See the *Class Schedule* to determine grading options for each course.

Change of Major—CEHD undergraduates who wish to change or add a major within the college should apply through SPS, 110 Wulling Hall (612-625-6501).

Graduation Requirements

Amount and Quality of Work—Completion of at least 120 credits with a C (2.00) average, including the specified coursework in psychology (minimum grade of C-) and writing, is required for graduation. Students in teaching licensure programs (agricultural and technology education) must earn a minimum 2.50 GPA to be recommended for state licensure. All GPA requirements for student teaching, internships, and graduation are computed using University of Minnesota, Twin Cities coursework only. Contact SPS, 110 Wulling Hall (612-625-6501), or the major department for specific requirements for individual majors.

Applying for a Degree—Students must apply to graduate one full semester before completion of the final coursework. The *Application for Degree* form may be completed at any of the One Stop Student Services Centers, 612-625-5333 or downloaded from the Web at <www.onestop.umn.edu/Forms/>. The final program form or degree audit must also be submitted to the faculty adviser at that time. In addition, students whose major fields are agricultural education; business and industry education; human resource development; kinesiology; recreation, park, and leisure studies; or technology education must file an adviser-approved program with the college's Student Scholastic Standing Committee.

Certification/Licensure

Certification

The college offers several certificates at the undergraduate level: coaching, sport management, human resource development, career and technical education, and disability policy and services. For more information about certificates, contact SPS (612-625-6501) or visit the Web site at <www.education.umn.edu/SPS/programs/certificates/>.

Licensure

To teach in a public school classroom, students must be licensed by the state. Three CEHD teacher licensure programs are offered at the undergraduate level: agricultural education; business and industry education: career and technical education; and technology education. All other CEHD initial licensure programs are offered at the master's level; students must first complete an undergraduate degree with appropriate prerequisites.

The college offers initial licensure programs in adult basic education, agricultural education, art education, business and marketing education, early childhood education and early childhood special education, elementary education, English education, family education, industrial education (technology education), mathematics education, physical education, science education, second languages and cultures education (including English as a second language), social studies education, and special education. These licensure programs reflect the most current thinking and research in the field, with strong clinical experiences and special attention to multicultural education. CEHD licensure programs are approved by the Minnesota State Board of Teaching and accredited by the National Council for the Accreditation of Teacher Education (NCATE).

Teaching licenses are awarded by the Minnesota State Board of Teaching; CEHD is responsible for recommending eligible candidates to the state. The CEHD recommendation for licensure is based on successful completion of coursework that includes a standards-based curriculum, favorable faculty judgment regarding teaching competence, and meeting minimum standards on state-required examinations.

Minnesota state law and a State Board of Teaching regulation require teacher licensure candidates to meet specific competencies. This requirement is met through a combination of required and elective coursework at the graduate level. Candidates also must pass the Praxis Series tests, which assess basic skills of reading, writing, and mathematics; content knowledge; and pedagogy and teaching methods. Minnesota state law also requires all initial licensure applicants to be fingerprinted and pass criminal background checks.

Early Admission Option

This program allows undergraduate juniors or seniors at the University of Minnesota to get a head start on a teaching career by offering preferred admission to a master of education (M.Ed.)/initial licensure program. Students in the early admission program explore the teaching profession by attending a one-credit course (EdHD 3001) with other pre-education students each semester. Students also spend at least 100 hours working in an educational setting, which fulfills one of the M.Ed./initial licensure program admission requirements. Students are expected to complete the undergraduate degree within two years of starting the early admission program and begin the M.Ed./initial licensure program within two years of receiving the B.S. or B.A. degree.

For more information about early admission requirements, contact SPS, 110 Wulling Hall (612-625-6501).

Advising

Student & Professional Services (SPS) is CEHD's centralized admissions and student services office (110 Wulling Hall, 612-625-6501 or on the Web at <www.education.umn.edu/SPS/>). SPS provides general information, enrollment, registration, and career services for prospective students, applicants, enrolled students, and graduates. Professional advising staff are available by appointment or on a walk-in basis during specific times each weekday to answer general questions regarding admission, program requirements, academic planning, registration, academic progress, scholarships, career services, teacher licensure, commencement, and other student-affairs issues. SPS also offers information group meetings monthly for individual degree programs.

Special Learning Opportunities, Resources, and Organizations

Diversity Initiatives

CEHD is committed to recruiting, enrolling, and educating a diverse population of students who represent the overall composition of U.S. society. The college has several programs that provide support for increasing its student population diversity. In addition, the college has an ongoing Committee on Diversity made up of students, faculty, and staff. For more information on college diversity initiatives, contact SPS, 110 Wulling Hall (612-625-6501) or visit the Web site at <www.education.umn.edu/SPS/prospective/diversity/>.

Computing Facilities

CEHD students have access to several instructional computing labs, four computer classrooms, and several smaller computer learning areas for students and faculty. For more information about University computing services and facilities, see Computing in the General Information section of this catalog.

College of Education and Human Development Alumni Society

Alumni can benefit from a combined membership in the Education and Human Development Alumni Society and the University of Minnesota Alumni Association (UMAA). With more than 5,000 members, the society sponsors programs and scholarships for current students and offers a variety of opportunities for alumni to stay connected to the college. Benefits include the CEHD alumni magazine, *The Link;* the UMAA magazine, *Minnesota;* discounts on Internet access; discounts on theatre and athletic tickets; and library access. For membership information, call 612-625-1310 or 800-UM ALUMS or visit the Web site at <www.education.umn.edu/alum/>.

Scholarships

In addition to financial aid opportunities offered by the University, CEHD administers several scholarship programs of its own. Awards are subject to change or cancellation depending on availability of funds. Details about qualifications and application materials and instructions may be obtained from department offices or SPS, 110 Wulling Hall (612-625-6501) or on the Web at <www.education.umn.edu/SPS/awards/>.

Career Information

Education and human development fields are among the fastest growing career tracks in the country. Demographic changes expected over the next several decades will cause increased demand for professionals in such fields as early childhood education, special education, English as a second language, recreation and leisure studies, technology education, child psychology, and human resource development. CEHD graduates work in public school classrooms, higher education institutions, corporate education settings, human service agencies, schools and clinics, and a broad range of other settings. SPS can provide career counseling and information as well as referrals to other University career and employment services.

Researchers at the college's Center for Applied Research and Educational Improvement (CAREI) authored a study that showed the negative impact of early school-starting times on teenage students. Many schools across Minnesota and the country adopted later start times as a result of this research.

Prospective students can learn more about the current employment outlook for teachers during information sessions, through individual advising, and from the college's annual placement report, *The Occupational Status Report of Graduates: How Their Careers Began.* For more information, contact SPS Career Services (612-625-9884) or see the Web site at <www.education.umn.edu/SPS/career/>.

Student Organization

The Association of Students in Education and Human Development (ASEHD) is open to all CEHD undergraduates as well as students in other University colleges who aspire to be educators or human development professionals. ASEHD has three subcommittees: intramurals, professional development, and community service. The intramural group participates in intramural sports organized by the University's Department of Recreational Sports. Students interested in learning more about their chosen careers participate in the professional development group. The community service group serves the college, University, and Twin Cities metropolitan area. For more information, contact SPS, 110 Wulling Hall (612-625-6501).

Directory

(area code 612)

Administrative Offices

College Office
104 Burton Hall, Minneapolis
<www.education.umn.edu/>
625-6806

Student & Professional Services (SPS)
110 Wulling Hall, Minneapolis
<www.education.umn.edu/SPS/>
625-6501, fax: 626-1580
e-mail spsinfo@umn.edu

Academic Progress
Admission
Advising
Career Services (625-9884)
Commencement
Graduation Requirements
Registration (625-5815)
Teacher Licensure

Development and Alumni Relations
105 Burton Hall, Minneapolis
625-1310

Departments

Curriculum and Instruction
145 Peik Hall, Minneapolis
<www.education.umn.edu/CI/>
Deborah Dillon, chair
625-1362

Educational Policy and Administration
330 Wulling Hall, Minneapolis
<www.education.umn.edu/EdPA>
James Hearn, chair
624-1006

Educational Psychology
206 Burton Hall, Minneapolis
<www.education.umn.edu/EdPsych>
Mary McEvoy, chair
624-3543

Institute of Child Development
180 Child Development Building, Minneapolis
<www.education.umn.edu/ICD>
Ann Masten, director
624-0526

Kinesiology
110 Cooke Hall, Minneapolis
Michael Wade, director
625-5300

Bob Pickert, undergraduate contact
625-8868

Work, Community, and Family Education
210A Vocational and Technical Education Building, St. Paul
<www.education.umn.edu/WCFE/>
Jane Plihal, chair
625-3757

Organizations

Association of Students in Education and Human Development
Student & Professional Services
110 Wulling Hall, Minneapolis
625-6501

College of Education and Human Development Alumni Society
105 Burton Hall, Minneapolis
<www.education.umn.edu/alum/>
625-1310

College of Education and Human Development

Degree Programs, Minors, and Certificates

Agricultural Education

Department of Work, Community, and Family Education

B.S.

The undergraduate agricultural education program is a collaborative partnership between CEHD and the College of Agricultural, Food and Environmental Sciences. Three specializations are available; the following two prepare students for Minnesota state teaching licensure:

- agricultural science and technology education
- natural and managed environmental education

The agricultural leadership, training, and development specialization prepares students for agricultural industry and leadership careers, but does not lead to teaching licensure.

Agricultural Science and Technology Education Specialization

This specialization serves students preparing to teach agriscience, agribusiness, agriculture, horticulture, food systems, agrimechanics, and natural resource management under the licensure field of agricultural education in public schools at the 5-12 level. The specialization's broad agricultural science and technology background also prepares graduates for a wide range of agriculturally related positions in sales, management, finance, and production aspects of agriculture.

Admission Requirements—Students may be admitted to this program as freshmen or may transfer into the program any semester. They must have a GPA of 2.50 for admission and complete the Praxis I: Pre-Professional Skills Tests (PPST).

Degree Requirements

Students may graduate from this program with a minimum 2.00 GPA, but a minimum 2.50 GPA is required for recommendation for a Minnesota teaching license.

Students must complete at least 128 credits to graduate, including required courses in the major. Students also must complete the University's liberal education requirements, including approved writing intensive (W) courses. For more information, see page 31 in this catalog.

The specialization requires a broad study of agriculture, including plant science (horticulture, agronomy, plant pathology, and entomology), animal science, natural resources, soils, economics and agribusiness, agricultural mechanization, food science, foundations of education, foundations of agricultural education, and a full-year student teaching experience.

Required Courses

Communications (11 cr)

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Physical and Biological Sciences (19-20 cr)

BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Biol 1009—General Biology (4 cr)
or Biol 1051—Introduction to Environmental Science (3 cr)
or Agro 1101—Biology of Plant Food Systems (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
MicB 2022—General Microbiology (2 cr)
Phys 1001W—Energy and the Environment (4 cr)
or Phys 1101W—Introductory College Physics I (4 cr)
ScAg 1501—Biotechnology, People, and the Environment (3 cr)

Mathematics (3 cr)

Math 1031—College Algebra and Probability (3 cr)

Social Science (8 cr)

HSci 1814—Introduction to History of Science: Ancient Science to the Scientific Revolution (4 cr)
or HSci 1815—Introduction to History of Science: Modern Science (4 cr)
Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr)

Agricultural Sciences and Applied Economics (40 cr)

Plant Science (6 cr)

Agri 3001—Pests and Crop Protection (3 cr)

Plus 3-4 credits from the following:

Agro 1103—Crops, Environment, and Society (4 cr)
Agro/Hort 4401—Plant Genetics and Breeding (4 cr)
Hort 1001—Plant Propagation (4 cr)
Hort 1002—Home Horticulture (3 cr)
Hort 1012—Woody Landscape Plants (3 cr)
Hort 1013—Floral Design (2 cr)
Hort 3002—Greenhouse Management (3 cr)

Animal Science (6 cr)

AnSc 1403—Companion Animal Nutrition and Care (2 cr)
or AnSc 2401—Animal Nutrition (3 cr)

Plus 3-4 credits from the following:

AnSc 1101—Introductory Animal Science (4 cr)
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 2301—Systemic Physiology (4 cr)
AnSc/Agro 3203W—Environment, Global Food Production, and the Citizen (3 cr)
AnSc 3221—Animal Breeding (4 cr)

Natural Resources (6 cr)

At least 6 credits from the following:

Agro/AnSc 3203W—Environment, Global Food Production, and the Citizen (3 cr)
EEB 3001—Ecology and Society (3 cr)
ES 1011—Issues in the Environment (3 cr)
ES 1051—Introduction to Environmental Science (3 cr)
FW 1002—Wildlife: Ecology, Values, and Human Impact (3 cr)
NRES 1201—Conservation of Natural Resources (3 cr)

Soils (4 cr)

Soil 1125—The Soil Resource (4 cr)
or Soil 2125—Basic Soil Science (4 cr)

Applied Economics and Agribusiness (8-9 cr)

ApEc 1101—Principles of Microeconomics (3 cr)
ApEc 3451—Food and Agricultural Sales (3 cr)

Plus 2-3 credits from the following:
ApEc 1251—Principles of Accounting (3 cr)
ApEc 3401—Markets, Marketing, and Prices (2 cr)
ApEc 3811—Principles of Farm Management (3 cr)
ApEc 3821—Retail Center Management (3 cr)

Agricultural Mechanization (6 cr)
Select two of the following courses:
AFEE 2051—Current Technical Competencies (3 cr)
AFEE/BIE 3112—Technical Drawing and Production Technologies (3 cr)
AFEE/BIE 3121—Communication, Energy and Power, Transportation and Machinery Technologies (3 cr)

Food Science (3 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)

Professional Education (38 cr)
Foundations (15 cr)
EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)
EdHD 5003—Developmental and Individual Differences in Educational Contexts (3 cr)
EdHD 5005—School and Society (2 cr)
EdHD 5007—Technology for Teaching and Learning (1.5 cr)
EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)
EdPA 5341—The American Middle School (3 cr)
PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)
or PubH 5003—Fundamentals of Alcohol and Drug Abuse (1 cr)

Agricultural Education (15 cr)
AFEE 1001—Introduction to Agricultural Education and Extension (1 cr)
AFEE 1002—Principles of Career Planning for Agricultural Professionals (1 cr)
AFEE 2096—Professional Practicum in Agricultural Education: Early Experience (1 cr)
AFEE 5111—Agricultural Education: Methods of Teaching (4 cr)
AFEE 5112—Agricultural Education Program Organization and Curriculum for Youth (3 cr)
AFEE 5114—Agricultural Education Teaching Seminar (1 cr)
AFEE 5116—Coordination of SAE Programs: Work-based Learning (2 cr)
AFEE 5118—Strategies for Managing and Advising the FFA Organization (2 cr)

Work, Community, and Family Education (8 cr)
WCFE 5697—Teaching Internships: School and Classroom Settings (2 cr)
WCFE 5698—Teaching Internship (6 cr)
Completion of standard first aid and cardiopulmonary resuscitation (CPR) training is required for licensure.

Natural and Managed Environmental Education Specialization

This specialization serves students preparing to teach agriscience, agribusiness, agriculture, horticulture, food systems, agrimechanics, and natural resource management, all under the licensure field of agricultural education in public schools at the 5-12 level. In addition, graduates have an emphasis in natural resource management and education and are prepared for work in environmental learning centers.

Admission Requirements—Students may be admitted to this program as freshmen or may transfer into the program any semester with a minimum overall GPA of 2.50 and complete the Praxis I: Pre-Professional Skills Tests (PPST).

Degree Requirements

Students may graduate from this program with a minimum 2.00 GPA, but a minimum 2.50 GPA is required for recommendation for a Minnesota teaching license.

Students must complete at least 128 credits, including required courses in the major. Students also must complete the University's liberal education requirements, including approved writing intensive (W) courses. For more information, see page 31 in this catalog.

The specialization requires a broad study in agriculture focused on the natural and managed environmental education areas. Areas of study include the environment, land, water, climate, economics, soil, plant science, animal science, and agricultural mechanization. It also includes foundations in education, foundations in agricultural education, and a full-year student teaching experience.

Required Courses

Communications (11 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Mathematics (3 cr)
Math 1031—College Algebra and Probability (3 cr)

Physical and Biological Science (19-20 cr)
BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Biol 1009—General Biology (4 cr)
or Biol 1051—Introduction to Environmental Science (3 cr)
or Agro 1101—Biology of Plant Food Systems (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
MicB 2022—General Microbiology (2 cr)
Phys 1001W—Energy and the Environment (4 cr)
or Phys 1101W—Introductory College Physics I (4 cr)
ScAg 1501—Biotechnology, People, and the Environment (3 cr)

Social Science (8 cr)
HSci 1814—Introduction to History of Science: Ancient Science to the Scientific Revolution (4 cr)
or 1815—Introduction to History of Science: Modern Science (4 cr)
Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr)

Natural and Managed Environmental Science (40 cr)
Environmental (9 cr)
ES 1011—Issues in Environment (3 cr)
Plus at least 6 credits from the following:
EEB 3001—Ecology and Society (3 cr)
ES 1051—Introduction to Environmental Science (3 cr)
FR 2104—Forest Measurement Techniques (1 cr)
FR 3104—Forest Ecology (4 cr)
FR 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
FW 1002—Wildlife: Ecology, Values, and Human Impact (3 cr)
FW 3003—Wildlife in Agricultural Land (2 cr)

Land, Water, Atmosphere (7 cr)
Soil 2125—Basic Soil Science (4 cr)
Plus 3-4 credits from the following:
NRES 1201—Conservation of Natural Resources (3 cr)
Soil 1425—The Atmosphere (3 cr)
Soil 3221—Soil Conservation and Land-Use Management (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)

Applied Economics and Agribusiness (3 cr)
ApEc 1101—Principles of Microeconomics (3 cr)
or ApEc 3451—Food and Agricultural Sales (3 cr)

Plant Science (6 cr)
Agri 3001—Pests and Crop Protection (3 cr)
Plus 3-4 credits from the following:
Agro/Hort 4401—Plant Genetics and Breeding (4 cr)
Agro or Hort (Electives)

Animal Science (6 cr)
AnSc 2401—Animal Nutrition (3 cr)
Plus 3-4 credits from the following
AnSc 1101—Introductory Animal Science (4 cr)
AnSc 1403—Companion Animal Nutrition and Care (2 cr)
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 3203W—Environment, Global Food Production, and the Citizen (3 cr)

Agricultural Mechanization (6 cr)
Select 6 credits from the following:
AFEE 2051—Current Technical Competencies (3 cr)
AFEE/BIE 3112—Technical Drawing and Production Technologies (3 cr)
AFEE/BIE 3121—Communication, Energy and Power, Transportation and Machinery Technologies (3 cr)

Food Science (3 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)

Professional Education (38 cr)
Foundations (15 cr)
EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)
EdHD 5003—Developmental and Individual Differences in Educational Contexts (3 cr)
EdHD 5005—School and Society (2 cr)
EdHD 5007—Technology for Teaching and Learning (1.5 cr)
EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)
EdPA 5341—The American Middle School (3 cr)
PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)
or PubH 5003—Fundamentals of Alcohol and Drug Abuse (1 cr)

Agricultural Education (15 cr)
AFEE 1001—Introduction to Agricultural Education and Extension (1 cr)
AFEE 1002—Principles of Career Planning for Agricultural Professionals (1 cr)
AFEE 2096—Professional Practicum in Agricultural Education: Early Experience (1 cr)
AFEE 5111—Agricultural Education: Methods of Teaching (4 cr)
AFEE 5112—Agricultural Education Program Organization and Curriculum for Youth (3 cr)
AFEE 5114—Agricultural Education Teaching Seminar (1 cr)
AFEE 5116—Coordination of SAE Programs: Work-based Learning (2 cr)
AFEE 5118—Strategies for Managing and Advising the FFA Organization (2 cr)

Work, Community, and Family Education (8 cr)
WCFE 5697—Teaching Internship: School and Classroom Settings (2 cr)
WCFE 5698—Teaching Internship (6 cr)
Completion of standard first aid and cardiopulmonary resuscitation (CPR) training is required for licensure.

Agricultural Leadership, Training, and Development Specialization

This specialization provides a unique, futuristic educational opportunity combining agricultural science, communication, leadership, education, business and industry, training, and development. It provides a general background in agriculture, with agribusiness and industry associations. This specialization does not lead to teaching licensure.

The agricultural industry is faced with leadership and employee training and development challenges. This specialization provides students with opportunities and flexibility in employment ranging from human resource development, sales and marketing, extension, and communications in statewide, national, and international situations.

Admission Requirements—Students may be admitted to this program as freshmen or may transfer into the program any semester. They must have a GPA of 2.00 for admission.

Degree Requirements

Students must complete at least 128 credits, including required courses in the major. Students also must complete the University's liberal education requirements, including approved writing intensive (W) courses. For more information, see page 31 in this catalog.

This specialization requires business experience as well as completion of courses. Students must maintain an overall GPA of 2.00.

Required Courses

Communications (11 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Mathematics (3 cr)
Math 1031—College Algebra and Probability (3 cr)

Physical and Biological Sciences (14 cr)
Agro 1101—Biology of Plant Food Systems (4 cr)
or Biol 1009—General Biology (4 cr)
BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Chem 1011—General Principles of Chemistry (4 cr)
ScAg 1501—Biotechnology: People and the Environment (3 cr)

Social Science (4 cr)
Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr)

Agricultural Sciences and Economics (52 cr)
Plant Science (9 cr)
Agri 3001—Pests and Crop Protection (3 cr)
Plus at least 6 credits from the following:
Agro 1103—Crops, Environment, and Society (4 cr)
Agro 2501—Weed Biology and Systematics (2 cr)
Agro 3005—Applied Crop Physiology and Development (2 cr)
AnSc 3203W—Environment, Global Food Production, and the Citizen (3 cr)
Hort 1001—Plant Propagation (4 cr)
Hort 1002—Home Horticulture (3 cr)
Hort 3005—Environmental Effects on Horticultural Crops (2 cr)

Animal Science (10 cr)
AnSc 1101—Introductory Animal Science (4 cr)
AnSc 1403—Companion Animal Nutrition and Care (2 cr)
or AnSc 2401—Animal Nutrition (3 cr)
Plus 3-4 credits from the following:
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 3203W—Environment, Global Food Production, and the Citizen (3 cr)

Soils (7 cr)
Soil 1125—The Soil Resource (4 cr)
or Soil 2125—Basic Soil Science (4 cr)
Plus 3 credits from the following:
Soil 1425—The Atmosphere (3 cr)
Soil 3221—Soil Conservation and Land-Use Management (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)

Applied Economics and Agribusiness (12 cr)
ApEc 1101—Principles of Microeconomics (3 cr)
ApEc 1251—Principles of Accounting (3 cr)
ApEc 3451—Food and Agricultural Sales (3 cr)
Plus 2-3 credits from the following:
ApEc 3401—Markets, Marketing and Prices (2 cr)
ApEc 3811—Principles of Farm Management (3 cr)
ApEc 3821—Retail Center Management (3 cr)

Agricultural Mechanization (3 cr)
AFEE 2051—Current Technical Competencies (3 cr)

Agricultural Leadership and Development (6 cr)
AFEE 4221—Rural Leadership Development (3 cr)
AFEE 5361—World Development Problems (3 cr)

Experiential Education (3 cr)
AFEE 3096—Experiential Learning: Production and Business (1–3 cr)

Agricultural Education and Extension (9 cr)
AFEE 1001—Introduction to Agricultural Education and Extension (1 cr)
AFEE 1002—Principles of Career Planning for Agricultural Professionals (1 cr)
AFEE 5111—Agricultural Education: Methods of Teaching (4 cr)
AFEE 5331—History, Philosophy, and Systems of Extension (3 cr)

The Tucker Center for Research on Girls and Women in Sport, the first center of its kind in the world, explores how sport, recreation, and physical activity affect the lives of girls and women.

Human Resource Development/Adult Education (15 cr)
HRD 5001W—Survey: Human Resource Development and Adult Education (3 cr)
HRD 5105—Strategic Planning in Human Resource Development (3 cr)
HRD 5201—Personnel Training and Development (3 cr)
HRD 5301—Organization Development (3 cr)
Plus (three) elective credits in HRD courses.

Emphasis Areas

Students must select 10 credits in one of the following three emphasis areas:

Agricultural Science (10 cr)
Agro 2103—Grain Grading and Crop Utilization (1 cr)
Agro 2105—Seed Technology (1 cr)
Agro 2501—Weed Biology and Systematics (2 cr)
Agro 3203W—Environment, Global Food Production, and the Citizen (3 cr)
Agro 3005—Applied Crop Physiology and Development (2 cr)
AnSc 1511—Food Animal Products for Consumers (3 cr)
AnSc 2012—Livestock and Carcass Evaluation (3 cr)
AnSc 2211—Biometrics for Livestock (3 cr)
AnSc 2301—Systemic Physiology (4 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)
PlPa 2002—Diseases of Field Crops (3 cr)
PlPa 3002—Air Pollution, People, and Plants: The Science and the Ethics (3 cr)

Agricultural Business and Management (10 cr)
ApEc 3041—Economic Development of U.S. Agriculture (3 cr)
ApEc 3401—Markets, Marketing, and Prices (2 cr)
ApEc 3411—Grain Marketing Economics (2 cr)
ApEc 3421—Livestock and Meat Marketing Economics (2 cr)
ApEc 3811—Principles of Farm Management (3 cr)

Communication (10 cr)
Rhet 1152W—Writing on Issues of Science and Technology (4 cr)
Rhet 3221W—Theories of Human Communication (4 cr)
Rhet 3257—Scientific and Technical Presentations (3 cr)
Rhet 3266—Group Process, Team Building, Leadership (3 cr)
Rhet 3401—Accessing Information Through Electronic Media (3 cr)

Business and Industry Education: Career and Technical Education

Department of Work, Community, and Family Education

B.S.

The major in business and industry education: career and technical education is a professional development degree program offering professional preparation in career and technical education.

Students may select one of several program options.

The **general career and technical education option** is for current and prospective technical college instructors and other educators who are *not* seeking teaching licensure for grades 9-12. Students completing this option are awarded the bachelor of science (B.S.) degree and concurrently complete the Teacher Education Series (TES).

The **licensure program option** prepares students for Minnesota teaching licensure for grades 9-12 in one of eight career and technical education fields in the following list:

- communication technology careers
- construction careers
- creative design careers
- early childhood careers
- hospitality service careers
- manufacturing careers
- medical careers
- transportation careers

For more information on program and licensure requirements, contact the BIE program adviser at 612-625-7250.

Admission Requirements—To be admitted to this program, students must have completed 30 credits (or sufficient verified and approved technical work experience to be awarded 30 credits toward the degree) and have a 2.50 minimum GPA.

Degree Requirements

Students may graduate from this 120-credit program with a minimum 2.00 GPA, but a minimum 2.50 GPA is required for recommendation for Minnesota teaching licensure. A minimum 2.00 GPA with no grade lower than C- is required for major courses with the following designators: BIE, HRD, and WCFE. A minimum grade of C- is also required for general psychology.

Students must also complete at least 30 credits at the University of Minnesota after admission to CEHD as a student in the bachelor of science program.

Students must complete the University's liberal education requirements, including approved writing intensive (W) courses. Courses that meet these requirements may be found in the current *Class Schedule* or on the Web at <www.onestop.umn.edu/schedule/html/tc.html>.

Required Courses

TES (Teacher Education Series) notation indicates that the course fulfills TES state licensure requirements.

Business and Industry Education Pedagogical Studies (19-22 cr)
BIE pedagogical studies includes courses in curriculum, teaching methods, testing, career guidance, and working with special-needs students, as well as in the history and purposes of business and industry education.
BIE 5325—Foundations of Industrial Education (3 cr)
or BIE 5401—Introduction to Business and Marketing Education (3 cr)
EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)
HRD/WCFE 3601—Student and Trainee Assessment (2 cr) TES
or HRD/WCFE 5601—Student and Trainee Assessment: Advanced (2 cr) TES
HRD/WCFE 3629—Course Development for Business and Industry (2 cr) TES
or HRD/WCFE 5629—Course Development for Business and Industry: Advanced (2 cr) TES
HRD/WCFE 3661—Instructional Methods for Business and Industry (2 cr) TES
or HRD/WCFE 5661—Instructional Methods for Business and Industry: Advanced (2 cr) TES

For business and marketing education students:
BIE 5463—Methods of Teaching Keyboarding and Word Processing (2 cr)
or BIE 5452—Methods of Teaching Business and Marketing Concepts (3 cr)
or BIE 5457—Methods of Teaching Business Employment and Marketing Employment (3 cr)
WCFE 1301—Introduction to Career and Technical Education Teaching (2 cr) TES. Required for initial state licensure (not required of students who have completed two of the other TES courses).
WCFE 5801—Educating Special Populations in Work, Community, and Family Settings (3 cr)

Two courses from the following list, as approved by an adviser:
BIE 5321—Vocational Guidance in Business and Industry Education (2 cr)
BIE 5344—Facilities Management in Business and Industry (3 cr)
BIE 5463—Methods of Teaching Keyboarding and Word Processing (2 cr)
BIE 5452—Methods of Teaching Business and Marketing Concepts (3 cr)
BIE 5457—Methods of Teaching Business Employment and Marketing Employment (3 cr)
BIE 5628—Multimedia Presentations in Business (3 cr)

Core Courses (44 cr)

Issues, structures, and functions of business and industry (8 cr)
Course selection must be approved by adviser.
WCFE 3011W—Introduction to Technology and Public Ethics (3 cr)
or WCFE 5011W—Technology and Public Ethics (3 cr)

Work experience in business and industry or career and technical specialization courses (30 cr)
At least 10 credits must be earned through BIE 5596 or verified work experiences.
BIE 3151—Technical Development: Advanced (1-30 cr)
BIE 5151—Technical Development: Specialized (1-12 cr)
BIE 5596—Occupational Experience in Business and Industry (1-10 cr)

Technical/occupational development in business or industry (6 cr)

BIE 3111—Exploring Technology Systems (3 cr)
BIE 3112—Technical Drawing and Production Technologies (3 cr)
BIE 3113—Manufacturing Technology (3 cr)
BIE 3114—Construction Technology (3 cr)
BIE 3121—Communication, Power and Energy, Transportation and Machinery Technologies (3 cr)
BIE 3122—Communication and Information Technology (3 cr)
BIE 3123—Energy, Power, and Transportation Technology (3 cr)
BIE 5011—Introduction to Computer Applications (3 cr)
BIE 5012—Advanced Word Processing (3 cr)
BIE 5013—Spreadsheet Analysis Using Computers (3 cr)
BIE 5014—Database Computer Applications (3 cr)
BIE 5015—Integrated Computer Applications in Business and Marketing Education (3 cr)
BIE 5151—Technical Development: Specialized (1-12 cr)
BIE 5596—Occupational Experience in Business and Industry (1-10 cr)

Additional requirements (12-17 cr)

AdEd 5102—Perspectives of Adult Learning and Development (3 cr)
BIE 1396—Supervised Career and Technical Teaching (4 cr) (required only of those students without teaching experience)
BIE 5011—Introduction to Computer Applications (3 cr)
EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)
PubH 3004—Basic Concepts of Personal and Community Health (4 cr)
or PubH 3001—Personal and Community Health (2 cr)
and PubH 3003/5003—Fundamentals of Alcohol and Drug Abuse (2 cr/1 cr)

Required for state career and technical licensure, and recommended for business education:

WCFE 3301—Philosophy and Practice of Career and Technical Education (2 cr) TES
or WCFE 5301—Philosophy and Practice of Career and Technical Education: Advanced (2 cr) TES

Electives—selected in consultation with adviser to complete 124 credits.

American Red Cross standard first aid and personal safety certificates must be current at graduation. Requirement may be waived for business education majors with adviser approval.

Coaching

School of Kinesiology

Minor Only

The coaching minor offers an in-depth study of the theoretical and practical nature of coaching through a planned and integrated series of courses. Completion of the coaching minor also will qualify the student for the University of Minnesota Coaching Certificate.

Additional offerings include certificates in coaching and sport management. For more information, see the Certificates section on page 125.

Admission Requirements—Admission is open to all University students. A *Coaching Program Application Form* must be submitted (available in 220 Cooke Hall).

Students must maintain a 2.50 GPA in courses submitted for the completion of the coaching minor.

Required Courses

Kin 3027—Human Anatomy for Kinesiology Students (3 cr)
or Kin 3111—Human Anatomy (2 cr)
or InMd 3001—Human Anatomy (3 cr)
and InMd 3002—Human Anatomy Laboratory (1 cr)
Kin 3113—First Responder for Coaches and Athletic Trainers (3 cr)
or current American Red Cross Standard First Aid and CPR certification
Kin 3114—Prevention and Care of Athletic Injuries (3 cr)
Kin 3133—Motor Control, Learning, and Development (3 cr)
Kin 3143—Organization and Management of Sport (3 cr)
or Kin 5725—Organization and Management of Physical Education and Sport (3 cr)
Kin 5697—Student Teaching: Coaching (1–10 cr)
Two courses from Kin 3112, 4385, 5126, 5136, SpSt 3621, 3641
Two courses from Kin 3168, 3169, 3171, 3172, 3173, 3174, 3175, 3176, 3177, 3178, 3179, 3181, 5720

Final Project

Kin 5697—Student Teaching: Coaching consists of two parts. The first part is a supervised coaching experience with a professional in the field (student coaching practicum covering a specific sport season from beginning to end). The second part involves participation in coaching seminar classes and a written integrative paper delving into such topics as a personal coaching philosophy, the role of coaching in society, and the identification and solution of various issues/challenges in coaching.

Foundations of Education: Early Childhood

Department of Curriculum and Instruction

B.S.

The foundations of education (FOE): early childhood program prepares upper-division (typically junior or senior) students to work with young children and their families and to work with both typically and atypically developing children. The curriculum includes an extensive core of liberal education courses that are central to early childhood teaching and child development.

The program prepares graduates to move into non-licensure educational settings (including day-care centers or youth community programs), pursue advanced degrees, or work in other settings where a strong liberal education base is useful.

In addition, the undergraduate degree program prepares students for entry into the master of education (M.Ed.)/ initial licensure program in early childhood and early childhood special education. M.Ed. admission requirements include successful completion of all requirements for the B.S. degree, and successful school practicum experiences. Preferred admission to the M.Ed. program requires a minimum 2.70 GPA.

Admission Requirements—To be admitted to this program, students must complete at least 60 semester credits in specified courses (contact SPS program adviser), and have a 2.00 minimum overall GPA; a higher GPA is recommended.

Degree Requirements

Students must have a total of 120 credits with a minimum 2.00 overall GPA to complete this program. A minimum 2.00 GPA with no grade lower than C- is required for major courses with the following designators and course numbers: CI, CPsy, EdHD, EPsy, and Kin 3327. A minimum grade of C- is also required for general psychology. Students seeking to pursue the M.Ed./initial licensure program in early childhood and early childhood special education and Minnesota state teaching licensure must have a 2.70 GPA in the undergraduate program and meet other requirements.

Students must complete the University's liberal education requirements, including the writing intensive (W) requirement. For more information, see page 31 in this catalog.

Content areas 1-6 listed below correspond to both the University's liberal education requirements and the college's FOE: early childhood requirements for the B.S. degree. By planning carefully, students can select courses that apply to both sets of requirements.

Content Areas

Courses prepare students for competency in Standard 1 of the Minnesota Standards of Effective Practice for Teachers (SEPT)—The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

Note: All exceptions to these requirements must have written approval of the FOE: early childhood adviser at Student & Professional Services, 110 Wulling Hall.

1. Basic Requirements

Pre-admission

(2 courses, must be completed before admission)

Psy 1001—Introduction to Psychology (4 cr)

or GC 1281—General Psychology (4 cr)

CPsy 2301—Introductory Child Psychology (4 cr)

or CPsy 3301—Introductory Child Psychology (4 cr)

or GC 2283—The Psychology of Human Development (4 cr)

Highly recommended elective

One year college-level second spoken language or American Sign Language (ASL)

2. Language and Communication (3 courses)

Two courses in language and communication

Comm 1101—Introduction to Public Speaking (3 cr)

or Comm 3402—Introduction to Interpersonal Communication (3 cr)

or GC 1461—Oral Communication in the Public Sphere (3 cr)

Ling 1701—Language and Society (4 cr)

One course in language development

CPsy 4345—Language Development and Communication (4 cr) (recommended course)

or EPsy 5603—Childhood Language Development: Classroom Implications (3 cr)

or Ling 5501—Introduction to Language Acquisition (3 cr)

3. Mathematics (3 courses)

One course in college algebra

Math 1031—College Algebra and Probability (3 cr)

One course in statistical reasoning

Psy 4801—Introduction to Statistics (3 cr) (recommended course)

or EPsy 3264—Basic and Applied Statistics (3 cr)

or GC 1454—Statistics (4 cr)

or Stat 1001—Introduction to the Ideas of Statistics (3 cr)

Logic/computer skills—Consult with adviser.

4. Science (3 courses)

For course selection, see liberal education charts in the *Class Schedule.*

Biological science with a lab

Select any liberal education course that satisfies the diversified core requirement for Biol/L (Biological Science with Laboratory).

Physical science with a lab

Select any liberal education physics or chemistry course that satisfies the diversified core requirement for Phys/L (Physical Science with Laboratory).

One science elective with or without a lab

Select any one liberal education course in the diversified cores of Biol/L, Biol/NL, Phys/L, or Phys/NL.

5. Social Studies (3 courses)

American history

Hist 1302—U.S. History: 1880 to Present (4 cr)

or Hist 1308—U.S. History: 1880 to Present (4 cr)

or GC 1231—U.S. Growth of National Power (4 cr)

Human geography

Geog 1301—Introduction to Human Geography (4 cr)

or Geog 3381—Population in an Interacting World (4 cr)

Cultural pluralism/diversity in the United States

CSCL 3979—Issues in Cultural Pluralism (3 cr)

or GC 1851—Multicultural Relations (3 cr)

or AmSt 3113W—America's Diverse Cultures (3 cr)

or Soc 3211W—American Race Relations (3 cr)

6. Communication Arts and Literature (4 courses)

First-year writing

EngC 1011, 1012, 1013, 1014—University Writing and Critical Reading (4 cr)

or GC 1421—Writing Laboratory: Basic Writing (3 cr)

and GC 1422—Writing Laboratory: Communicating in Society (3 cr) or equivalent

Children's literature

CI 5401—Children's Literature in the Elementary School (3 cr)

American literature

EngL 1201W—Introduction to American Literature (4 cr)

or EngL 1301W—Introduction to Multicultural American Literature (4 cr)

or EngL 3005W—Survey of American Literatures and Cultures I (4 cr)

or EngL 3006W—Survey of American Literatures and Cultures II (4 cr)

or EngL 3591—Introduction to African American Literature (3 cr)

or GC 1364— Literature of the American Immigrant Experience (3 cr)

or GC 1365W—Literatures of the United States (3 cr)

or GC 1816—African American Literature (3 cr)

or GC 1836—Asian American Literature (3 cr)

Arts and humanities

One elective from the following areas is required: music, art, dance, theater, philosophy

7. Foundation Courses (taken after admission)

Students are required to take four courses in the Required Courses list as part of the program and at least 4 credits from the Other Courses list. Remaining credits from this list will be taken for graduate credit, as part of the M.Ed./initial licensure program in early childhood and early childhood special education.

Required Courses

CPsy 4336—Development and Interpersonal Relations (4 cr)

CPsy 4343—Cognitive Development (4 cr)

CPsy 4993 —Directed Instruction in Child Psychology (3 cr)

Kin 3327—Teaching Physical Education in the Elementary School (2 cr) or equivalent

Other Courses (4 cr min)

CPsy 4334W—Children, Youth, and Society (4 cr)

EPsy 5849—Observation and Assessment of the Preschool Child (3 cr)

EdHD 5007—Technology for Teaching and Learning (1.5 cr)

EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)

PubH 3003/5003—Fundamentals of Alcohol and Drug Abuse (2 cr/1 cr)

8. Major Courses (taken after admission)

Students are required to complete a minimum of 29 out of 39 credits of the following major courses for graduation from the program. Remaining major coursework will be taken for graduate credit, as part of the M.Ed./initial licensure program in early childhood and early childhood special education.

Junior Year

Fall or spring semester

CI 5111—Introduction to Elementary School Teaching (3 cr)

Fall semester

CI 5251—Social and Philosophical Foundations of Early Childhood Education (3 cr)

CI 5253—Cognitive and Creative Learning in Early Childhood Education (3 cr)

Spring semester

CI 5252—Facilitating Social and Physical Learning in Early Childhood Education (3 cr)

Senior Year

Fall or spring semester

CI 5281—Student Teaching in Early Childhood Education (3-6 cr)

EPsy 5625—Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2 cr)

Spring semester

EPsy 5681—Education of Infants, Toddlers, and Preschool Children with Disabilities: Methods and Materials (3 cr)

Other major courses toward 29-credit minimum

CI 5183—Applying Instructional Methods in the Elementary Classroom (2 cr)

CI 5415—Literacy Development in the Primary Grades (3 cr)

CI 5504—Elementary School Science (3 cr)

CI 5731—Social Studies for the In-service Elementary Teacher (3 cr)

CI 5821—Teaching Mathematics in the Elementary School (2 cr)

EPsy 5609—Family-Centered Services (2 cr)

EPsy 5616—Behavior Analysis and Classroom Management (3 cr)

Many of the major courses have an experiential component.

Foundations of Education: Elementary

Department of Curriculum and Instruction

B.S.

The B.S. in foundations of education (FOE): elementary prepares students to work with children, including those with special needs and in urban school settings.

The program serves as preparation for the master of education (M.Ed.)/initial licensure program in elementary education, which leads to state of Minnesota teaching licensure. It also prepares graduates to work in non-licensure educational settings (day-care centers or youth community programs) or other settings where a strong liberal education base is useful. The curriculum includes an extensive core of liberal education coursework that is central to elementary school teaching.

Students are eligible to pursue the M.Ed./initial licensure program in elementary education with an urban/special education emphasis after successfully completing all requirements for the B.S. degree with a minimum 2.80 GPA and successful school practicum experiences. Licensure requirements can be completed with a designated cohort in approximately two additional semesters of courses and clinical experience.

Admission Requirements—To be admitted to this program, students must complete 60 credits in specified courses (contact SPS) and have an overall GPA of 2.50 (higher recommended), education-related experience with grades K–6, and experience with diverse populations.

Degree Requirements

Students must have a total of 120 credits with a minimum 2.00 overall GPA to complete this program. A minimum 2.00 GPA with no grade lower than C- is required for major courses with the following designators and course numbers: CI, EdHD, EPsy 5613, and EPsy 5616. A minimum grade of C- is also required for general psychology. Students seeking to pursue the M.Ed./initial licensure program in elementary education and Minnesota state teaching licensure must have a 2.80 GPA in the undergraduate program and meet other requirements.

Students must complete the University's liberal education requirements, including the writing intensive (W) requirement. For more information, see page 31 in this catalog.

Content areas 1-6 listed below correspond to both the University's liberal education requirements and the college's FOE: elementary requirements for the B.S. degree. By planning carefully, students can select courses that apply to both sets of requirements.

Curriculum—Students in the FOE: elementary program who decide to pursue the M.Ed./initial licensure program in elementary education must meet all content area requirements for the B.S. degree and an additional set of requirements for one of five preadmission specialty areas: preprimary education (ages 3-4) or one of the four middle school specialty areas (grades 5-8) in math, science, social studies, or communication arts and literature.

Content Areas

Courses allow students to work toward competency in Standard 1 of the Minnesota Standards of Effective Practice for Teachers (SEPT)—The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

Note: All exceptions to these requirements must have written approval of the FOE adviser at Student & Professional Services (SPS), 110 Wulling Hall.

1. Basic Requirements (4 courses)

Pre-admission courses

(These courses must be completed before admission)

CI 1001—Introduction to the Elementary School (3 cr)

Psy 1001— Introduction to Psychology (4 cr)

or GC 1281—General Psychology (4 cr)

Volunteering as reading tutors with the University's Literacy Initiative is a popular way for CEHD students and alumni to reach out to the community and spread the joy of reading.

Language and communication

Ling 1701—Language and Society (4 cr) (recommended course)

or EngL 3601W—Analysis of English Language and Culture (4 cr)

or Ling 3001—Introduction to Linguistics (4 cr)

or Ling 5001—Introduction to Linguistics (4 cr)

Musical aptitude

Mus 1001—Fundamentals of Music (3 cr)

This requirement may be waived for students who have musical aptitude equivalent to five-six years' study of an instrument, through high school. Contact SPS preadmission adviser for more information.

2. Mathematics (4 courses)

One course in college algebra

Math 1031—College Algebra and Probability (3 cr)

Mathematics for elementary education

Math 3113—Topics in Elementary Mathematics I (4 cr)

Math 3118—Topics in Elementary Mathematics II (4 cr)

One course in statistical reasoning, calculus, or logic

EPsy 3264—Basic and Applied Statistics (3 cr) *

or GC 1454—Statistics (4 cr) *

or GC 1456—Functions and Problems of Logic (3 cr)

or Math 1142—Short Calculus (4 cr) *

or Math 1271—Calculus I (4 cr) *

or Phil 1001—Introduction to Logic (4 cr)

or Stat 1001—Introduction to the Ideas of Statistics (3 cr) *

* Students pursuing a middle-school specialty area in mathematics must complete one course in statistics and one course in calculus from the preceding list.

3. Science (4 courses)

Biological science with a lab

Biol 1001—Introductory Biology: Evolutionary and Ecological Perspectives (4 cr)

or Biol 1009—General Biology (4 cr)

or GC 1131W—Principles of Biological Science (4 cr)

Physical science with a lab

Phys 3071W—Laboratory-Based Physics for Teachers (4 cr) (recommended course)

or Chem 1011—General Principles of Chemistry (4 cr)

or Chem 1021—Chemical Principles I (4 cr)

or Chem 1022—Chemical Principles II (4 cr)

or Phys 1001W—Energy and Environment (4 cr)

or Phys 1101W—Introductory College Physics I (4 cr)

or Phys 1201W—Introductory College Physics II (4 cr)

or GC 1163—Physical Systems: Principles and Practices (4 cr)

Earth science with a lab

Ast 1001—Exploring the Universe (4 cr)

or Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)

or Geo 1002—Earth History (4 cr)

or GC 1171—Physical Geology (4 cr)

or GC 1172—Historical Geology (4 cr)

or GC 1173—Geology of the National Parks (4 cr)

One science elective with or without a lab

Select any one course in biological sciences, physical sciences, earth sciences, or environmental sciences.

FScN 1112—Principles of Nutrition (3 cr) (recommended course)

4. Social Studies (4 courses)

American history

Hist 1302W—U.S. History: 1880 to Present (4 cr)

or Hist 1308—U.S. History: 1880 to Present (3 cr)

or GC 1231W—U.S. Growth of National Power (4 cr)

Non-U.S. history elective

Select any one historical perspective course in world history, European history, western civilization, or the history of another country (other than the United States).

Human geography

Geog 1301W—Introduction to Human Geography (4 cr)

or Geog 3381W—Population in an Interacting World (4 cr)

Cultural pluralism/diversity in the United States

AmSt 3113W—America's Diverse Cultures (3 cr)

or CSCL 3979—Issues in Cultural Pluralism (3 cr)

or GC 1851—Multicultural Relations (3 cr)

or Soc 3211W—American Race Relations (3 cr)

5. Communication Arts and Literature (4 courses)

First-year writing

EngC 1011, 1012, 1013, 1014—University Writing and Critical Reading (4 cr)

or GC 1421 (3 cr) and GC 1422—Writing Laboratory: Basic Writing (3 cr)

or equivalent

Literature of American minorities

Afro 3591W/EngL 3591W—Introduction to African American Literature (3 cr)

or Afro 3592/EngL 3592—Introduction to Black Women Writers in the United States (3 cr)

or EngL 1301W—Introduction to Multicultural American Literature (4 cr)

or EngL 3300—Topics in Multicultural American Literatures: Fiction Across Cultures (3 cr)

or GC 1364— Literature of the American Immigrant Experience *(3* cr)

or GC 1816—African American Literature (3 cr)

or GC 1836—Asian American Literature (3 cr)

Contemporary literature: international perspectives

Afro 3601—Introduction to African Literature (3 cr)

or EngL 1401W—Introduction to World Literatures in English (4 cr)

or EngL 3171—Modern British Literatures and Cultures (3 cr)

or EngL 3180—Contemporary Literatures and Cultures (3 cr)

or GC 1367W—Contemporary Literature: International Perspectives (4 cr)

Arts and humanities elective

Students must complete one additional elective course in arts and humanities from the following areas: art, creative writing, dance, humanities, literature, theater, philosophy, or speech.

Students pursuing the middle-school specialty area in communication arts and literature are required to take one of the following courses in creative writing to fulfill this requirement.

EngW 1101W—Introduction to Creative Writing (4 cr)

or EngW 1102—Introduction to Fiction Writing (3 cr)

or EngW 1103—Introduction to Poetry Writing (3 cr)

or EngW 1104—Introduction to Literary Nonfiction Writing (3 cr)

or EngW 3102—Intermediate Fiction Writing (3 cr)

or EngW 3104—Intermediate Poetry Writing (3 cr)

or EngW 3106—Intermediate Literary Nonfiction Writing (3 cr)

6. Second Language

(Completion recommended before admission)

One year of college-level study in a second spoken language (8 cr)

or one year of college-level study in American Sign Language (8 cr)

or proficiency exam

7. Major Courses (taken after admission to the program)

Introduction to elementary education

(Must be taken as a block during first semester in the program*)*

CI 5111—Introduction to Elementary School Teaching (3 cr)

CI 5183—Applying Instructional Methods in the Elementary Classroom (1 cr)

EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)

Special education core

(Taken as a block one year after the first block)

CI 5183—Applying Instructional Methods in the Elementary Classroom (1 cr)

EPsy 5613—Foundations of Special Education I (3 cr)

EPsy 5616—Behavior Analysis and Classroom Management (3 cr)

Foundations of education courses

EdHD 5003—Developmental and Individual Differences in Educational Contexts (3 cr)

EdHD 5005—School and Society (2 cr) (taken senior year)

EdHD 5007—Technology for Teaching and Learning (1.5 cr)

EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)

PubH 3003/5003—Fundamentals of Alcohol and Drug Abuse (2 cr/1 cr)

Course for middle-school specialty area (grades 5-8)

Students selecting a grades 5-8 middle-school specialty in mathematics, science, social studies, or communication arts and literature

CPsy 4303—Adolescent Psychology (4 cr)

Courses for preprimary specialty area (ages 3-4)

CPsy 2301—Introductory Child Psychology (4 cr)

or CPsy 3301—Introductory Child Psychology for Social Sciences (4 cr)

or GC 2283—The Psychology of Human Development (4 cr)

CPsy 4336—Development and Interpersonal Relations (4 cr)

CPsy 4343—Cognitive Development (4 cr)

CPsy 4993—Directed Experiences/Early Childhood Education (3 cr)

Human Resource Development

Department of Work, Community, and Family Education

B.S.

The B.S. in human resource development prepares students for positions in business, training and development, quality improvement, career development, employee assistance, and other areas.

Undergraduate students prepare for entry-level employment in training and development and build the foundation for advanced work in the fields of human resource development or human resources and industrial relations. All students also select a programmatic or thematic supporting program, usually from the fields of business, human resources and industrial relations, speech communications, and rhetoric, though there are no restrictions on what this supporting program might be.

The program core requires all students to develop a baseline understanding of training and development, organization development, and adult education. With an international reputation for excellence, the program also supports the Human Resource Development Research Center and an outstanding student organization providing additional opportunities for students' professional development.

A human resource development certificate is also available. For more information, see the Certificates section on page 125.

Admission Requirements—Admission to this program is competitive due to program capacity; a minimum 2.50 overall GPA is recommended.

Degree Requirements

Students must complete this program with a total of 120 credits including at least 40 credits in the major, with a minimum 2.00 overall GPA. A minimum 2.00 GPA with no grade lower than C- is required for major courses with the following designators: AdEd, BIE, FE, HRD, and WCFE. A minimum grade of C- is also required for general psychology.

Students also must complete the University's liberal education requirements, including approved writing intensive (W) courses. For more information, see page 31 in this catalog.

All human resource development students must complete a core of 21 credits consisting of courses in training and development, organization development, and adult education; a supporting program of 13 credits (to be selected in conjunction with the student's adviser); an internship; and liberal education requirements, including some specified courses within those requirements (contact SPS). Students must complete 30 credits of residency in the college with at least 20 credits in the senior year. An overall GPA of 2.00 is required for graduation.

Required Courses

Comm 1101—Fundamentals of Speech Communications (4 cr)

or Rhet 1223—Public Speaking (4 cr)

Econ 1101—Principles of Microeconomics (4 cr)

or Econ 1102—Principles of Macroeconomics (4 cr)

Math 1001—Excursions in Mathematics (3 cr)

or Math 1031—College Algebra and Probability (3 cr)

or a higher level math course, not statistics

Psy 1001—Introduction to Psychology (4 cr)

or GC 1281—General Psychology (4 cr)

WCFE 3011W—Introduction to Technology and Public Ethics (3 cr)

Writing intensive (W) requirement, including Rhet 3562—Technical and Professional Writing (4 cr) or other advanced composition course

All students must have basic competence in computer applications. Students lacking such competence at the time of admission must take the following course:

BIE 5011—Introduction to Microcomputer Applications (3 cr)

Students with basic competence must take one advanced course, in consultation with adviser.

Human Resource Development (21 cr min)

BIE 5661—Instructional Methods in Business and Industry (2 cr)

or AdEd 5101—Strategies for Teaching Adults (3 cr)

HRD 5001W—Survey: Human Resource Development and Adult Education (3 cr) (undergraduate student section registration only)

HRD 5196—Internship: Human Resource Development (4 cr)

HRD 5201—Personnel Training and Development (3 cr)

HRD 5301—Organization Development (3 cr)

Additional courses, to meet the 21-credit total, are to be selected from other HRD courses and the following:

FE 5201—Family and Work Relationships (3 cr)

WCFE 5121—Principles of Supervisory Management (3 cr)

Supporting program (13 cr min)

Students choose at least 13 credits of coursework to fulfill programmatic or thematic requirements.

Kinesiology

School of Kinesiology

B.S.

The bachelor of science program in kinesiology prepares individuals for roles in sports/health clubs or corporate fitness/exercise centers or serves as background for exercise rehabilitation, exercise physiology, biomechanics, social psychology of sport, motor behavior, ergonomics, human factors, and other human performance contexts. Kinesiology is an appropriate major for students seeking careers in the fitness/wellness industries or the allied health sciences, such as physical and occupational therapy, medicine, and nursing. It can be used as preparation for the M.Ed./initial licensure program in physical education.

The curriculum includes two years of liberal education; a core of basic and applied sciences; physical activity skills; courses in kinesiology's major subdisciplines; and practicum experience in various sport, exercise, educational, or public service, workplace, or clinical settings.

Emphasis areas in the kinesiology major include exercise science/exercise physiology, fitness-wellness/corporate fitness, pre-physical education teaching, pre-physical therapy or pre-occupational therapy, sport psychology, sport sociology, and human factors/ergonomics.

Additional offerings include a coaching certificate, a coaching minor, and a sport management certificate.

Many students in the kinesiology program prepare for careers and further study in physical or occupational therapy or medical school.

Admission Requirements—Admission is based on the following:

- A 2.50 overall GPA
- Sixty credits, completed or in progress, including the following courses that partially fulfill the University's liberal education requirements for graduation:
- One 3-credit speech performance course
- One course each in biology, chemistry, and physics (all with labs)
- One course in statistics preferred (college algebra or calculus acceptable if needed for physics prerequisite)
- Psy 1001—Introduction to Psychology (4 cr) or GC 1281—General Psychology (4 cr) (grade of C- or higher required)

The following courses are strongly recommended, but not required, before admission to the program.

- Kin 3027—Human Anatomy for Kinesiology Students (3 cr)

  or InMd 3001—Human Anatomy (3 cr)

  and InMd 3002—Human Anatomy Laboratory (1 cr)
- Kin 1871—Introduction to Kinesiology (2 cr)
- Five physical activity courses (1 cr each) chosen from at least four of the following categories: aquatics, conditioning and weight training, dance, individual and dual sports/activities, team sports/activities. Students seeking K-12 physical education licensure must complete additional requirements; consult with a faculty adviser.

Degree Requirements

Students must complete this program with a total of 120 credits including 54 credits in the major, with a minimum 2.00 overall GPA. Students pursuing physical education teaching licensure must earn a minimum 2.00 GPA with no grade lower than C- for major courses with the following designators and numbers: CPsy 2301, CPsy 4303, EdHD, and Kin. Students pursuing non-teaching emphasis areas must earn a minimum grade of C- in Kin-designated coursework. A minimum grade of C- is also required for general psychology.

Students seeking to pursue the M.Ed./initial licensure program in physical education and Minnesota state teaching licensure must have a 2.80 GPA in the undergraduate program and meet other requirements.

Students also must complete the University's liberal education requirements, including approved writing intensive (W) courses. For more information, see page 31 in this catalog.

Required Courses

Kin 1871—Introduction to Kinesiology (2 cr) (recommended prerequisite)
Kin 3027—Human Anatomy for Kinesiology Students (3 cr)
or InMd 3001—Human Anatomy (3 cr)
and InMd 3002—Human Anatomy Laboratory (1 cr) (preferred for physical therapy)
Kin 3112—Introduction to Biomechanics (3 cr)
Kin 3126W—Psychology and Sociology of Sport (3 cr)
Kin 3131W—History and Philosophy of Sport (3 cr)
Kin 3133—Motor Control, Learning, and Development (3 cr)
Kin 3151—Measurement, Evaluation, and Research in Kinesiology (3 cr)
Kin 3385—Human Physiology for Kinesiology Students (3 cr)
or Phsl 3051—Human Physiology (4 cr)
Kin 4385—Exercise Physiology (4 cr)

Electives

21–28 credits (8–9 credits must be Kin 3xxx/5xxx courses)

Special Requirements

PubH 3004—Basic Concepts in Personal and Community Health (4 cr)
or PubH 3001—Personal and Community Health (2 cr)
and PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)
First aid and CPR certification at time of graduation

Field Experience or Directed Study

All upper division students are required to complete 10 credits in practical experiences, coaching, or directed study in their selected area of focus. Students select a total of 10 credits from a combination of:

Kin 3993—Directed Study in Kinesiology (1-10 cr)
Kin 3696—Supervised Practical Experience (1-10 cr)
Kin 5697—Student Teaching: Coaching (1–10 cr)
Kin 5196—Practicum: Developmental/Adapted Physical Education (1-4 cr)

Recreation, Park, and Leisure Studies

School of Kinesiology

B.S.

The undergraduate program in recreation, park, and leisure studies prepares students to assume leadership, supervisory, or beginning administrative responsibilities in various park, recreation, and leisure service agencies and for therapeutic recreation certification and practice. The program also prepares students for graduate study in outdoor recreation/education, park and recreation administration, sport management, and therapeutic recreation. Many students combine recreation, park, and leisure studies with coursework in other disciplines, such as management, social work, physical and occupational therapy, creative arts, human growth and development, special education, and psychology.

Students pursuing a B.S. degree in recreation, park, and leisure studies may choose one of two options:

- leisure services management emphasis areas that include commercial parks and recreation, outdoor recreation/education, or public parks and recreation
- therapeutic recreation emphasis areas that includes community-based or clinical-based recreation. (Completion of this program meets the requirements for certification by the National Council on Therapeutic Recreation Certification.)

Additional offerings include a coaching certificate, a coaching minor, and a sport management certificate. For more information, see the Certificates section on page 125.

Admission Requirements—To be admitted to this program, students must complete at least 30 credits of the University's liberal education requirements, including the writing intensive requirement; have earned a minimum overall GPA of 2.00, with preference given to applicants with a higher average; and have

relevant education- or career-related experience, paid or volunteer. For more information about liberal education requirements, see page 31 in this catalog. Appropriate related and major courses may be applied toward these requirements.

Degree Requirements

Students must have a total of 120 credits with a minimum 2.00 overall GPA to complete this program. A minimum 2.00 GPA with no grade lower than C- is required for Rec-designated courses. A minimum grade of C- is also required for general psychology.

Required Courses

Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr) (grade of C- or higher)
Soc 1001—Introduction to Sociology (3 cr)

Leisure services management courses

Pol 1001—American Democracy in a Changing World (4 cr)
Econ 1101—Principles of Microeconomics (4 cr)

Therapeutic recreation course

CPsy 2301—Introductory Child Psychology (4 cr)

College and curriculum requirements

Comm 1101—Introduction to Public Speaking (3 cr)
or Comm 1313W—Analysis of Argument (3 cr)
or GC 1461—Oral Communication in the Public Sphere (3 cr)
or Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Physical activity courses (3 courses, 1 cr each)
Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr) (grade of C- or higher)
PubH 3004—Basic Concepts in Personal and Community Health (4 cr)
or PubH 3001—Personal and Community Health (2 cr)
and PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)
Rec 1501—Orientation to Leisure and Recreation (3 cr)
Rec 3281—Research and Evaluation in Recreation, Park, and Leisure Studies (4 cr)
Rec 3541W—Recreation Programming (3 cr)
Rec 3551—Administration and Finance of Leisure Services (4 cr)
Rec 3601—Leisure and Human Development (3 cr)
Rec 5271—Community Leisure Services for Persons with Disabilities (3 cr)
Rec 3796—Senior Internship in Recreation, Park, and Leisure Studies (12 cr)
16 credits in recreation courses related to an emphasis area, selected in consultation with a major adviser.
24 credits related to the selected emphasis area (no more than three 1xxx courses), selected in consultation with an appropriate academic adviser. To become professionally certified as a therapeutic recreation specialist, certain specific courses also are required in the therapeutic recreation option, including abnormal psychology, anatomy, and physiology.

Electives—Any course for which a student has appropriate prerequisites and has been approved by the adviser relative to programmatic focus can be used toward this degree.

Final Project

After meeting eligibility requirements, students complete an intensive 12-credit senior internship (Rec 3796). Students should see their adviser and the internship coordinator no later than the early part of the semester preceding registration for Rec 3796. An internship manual may be obtained from the division office or from the internship coordinator.

Sport Studies

School of Kinesiology

B.S.

The sport studies major focuses on contemporary sport as a product of social, psychological, and economic phenomena. Because of its prominent role in our culture, economy, and societal behavior, sport is a popular subject for academic inquiry. While open to all who meet the admission requirements, the sport studies major addresses in part the need of those students who have a primary interest in sport as an activity that has been and continues to be a major force in their lives. Graduates may find employment in sport or other fitness-related occupations. The program also prepares students for graduate study in sport management.

Coursework in sport studies addresses such topics as ethics and sport, psychology of sport performance, sport as a sociocultural phenomenon, sport management, sport facilities, event management, and sport marketing and promotion.

Features of the program include an 8-credit experiential course, a senior seminar, and a set of focused electives. Each student selects electives from one of the following three emphasis areas: coaching, sport management, or youth services/development.

Additional offerings include a coaching certificate, a coaching minor, and a sport management certificate. For more information, see the Certificates section on page 125.

Admission Requirements—To be admitted to this program, students must have 60 credits completed or in progress. Admission preference is given to students who have completed liberal education requirements and have an overall GPA of 2.00 before the March 1 admission deadline. For more information about liberal education requirements, see page 31 in this catalog.

Degree Requirements

Students must have a total of 120 credits with a minimum 2.00 overall GPA to complete this program. A minimum 2.00 GPA with no grade lower than C- is required for SpSt-designated courses. A minimum grade of C- is also required for general psychology.

Required Courses

Social science course requirements (12 cr min)

Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr) (grade of C- or better)
Soc 1001—Introduction to Sociology (3 cr)
Recommended for the sport management focused elective:
Econ 1101—Principles of Microeconomics (4 cr)
5 additional credits including historical perspective liberal education requirement

Major Courses (27 cr)

SpSt 1701—Introduction to Sport Studies (2 cr) (recommended before admission to the program)
SpSt/Kin 3143—Organization and Management of Sport (3 cr)
SpSt 3501—Sport in a Diverse Society (3 cr)
SpSt 3611—Sport Psychology (2 cr)
SpSt 3601—Ethics and Values in Sport (2 cr)
SpSt 3861—Legal Aspects of Sport (2 cr)
SpSt 3881W—Senior Seminar in Sport Studies (3 cr)
SpSt 3996—Practicum: The Sport Experience (10 cr)

College and Curriculum Requirements (16 cr min)

Comm 1101—Introduction to Public Speaking (3 cr)
or Comm 1313—Analysis of Argument (3 cr)
or GC 1461—Oral Communication in the Public Sphere (3 cr)
or Rhet 1223—Oral Presentations in Professional Settings (3 cr)

As part of their School of Kinesiology programs, many students get a taste of life with Minnesota's professional sports teams by interning with the Vikings, Timberwolves, Twins, Wild, Lynx, or St. Paul Saints.

Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr)
PubH 3004—Basic Concepts in Personal and Community Health (4 cr)
or PubH 3001—Personal and Community Health (2 cr)
and PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)
Soc 1001—Introduction to Sociology (3 cr)
Education and human development electives (not including Kin, Rec, or SpSt courses) (6 cr)
Physical education activity courses (3 courses, 1 cr each)

Focused Elective (20 cr min)

In consultation with the sport studies major adviser, each student selects at least 20 credits from one of the following three sets of focused electives:

Coaching

FScN 1112—Principles of Nutrition (3 cr)
GC 1571—Introduction to Microcomputer Applications (4 cr)
SpSt 3111—Sports Facilities (2 cr)
SpSt 3112—Applied Sport Science (2 cr)
SpSt 3621—Applied Sport Psychology (2 cr)
SpSt 3641—Training and Conditioning for Sport (2 cr)

Students also may choose courses from the following list to meet requirements for coaching certification or the coaching focused elective. For more information, contact SPS advisers:

Kin 3111—Human Anatomy (2 cr)
or CBN 1027—Human Anatomy for Kinesiology Students (3 cr)
or CBN 5058—Human Anatomy for Physical Therapy (5 cr)
Kin 3113—First Responder for Coaches and Athletic Trainers (3 cr)
Kin 3114—Prevention and Care of Athletic Injuries (3 cr)
Kin 3133—Motor Control, Learning, and Development (3 cr)
Kin 5697—Student Teaching: Coaching (1–10 cr)

Two of the following courses:

Kin 3112, 4385, 5126, 5136, SpSt 3621, 3641

Two of the following courses:

Kin 3168, 3169, 3171, 3172, 3173, 3174, 3175, 3176, 3177, 3178, 3179, 3181, 5720

Sport Management

BLaw 3058—The Law of Contracts and Agency (4 cr)
BLaw 5078—Partnerships and Corporations (2 cr)
Comm 3201—Introduction to Electronic Media Production (3 cr)
Comm 3441—Introduction to Organizational Communication (3 cr)
Econ 1102—Principles of Macroeconomics (4 cr)
GC 1540—Accounting Fundamentals 1 (3 cr)
or Acct 2050—Introduction to Financial Reporting (4 cr)
GC 1571—Introduction to Microcomputer Applications (4 cr)
or BIE 5011—Introduction to Microcomputer Applications (3 cr)
HRD 5201—Personnel Training and Development (4 cr)
HRIR 3021—Human Resource Management and Industrial Relations (3 cr)
Kin 5115—Event Management in Sport (3 cr)
Mktg 3001—Principles of Marketing (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
SpSt 3111—Sports Facilities (2 cr)
SpSt 3421—The Business of Sport (2 cr)
SpSt 3631—Sport Promotion and Programming (2 cr)

Youth Services/Development

CPsy 3301—Introductory Child Psychology for Social Sciences (4 cr)
CPsy 4303—Adolescent Psychology (4 cr)
CPsy 4331—Social and Personality Development (4 cr)
CPsy 4334W—Children, Youth in Society (4 cr)
EdPA 5372—Youth in Modern Society (3 cr)
FSoS 1101—Intimate Relationships (3 cr)
GC 1571—Introduction to Microcomputer Applications (4 cr)
or BIE 5011—Introduction to Microcomputer Applications (3 cr)
Kin 1989—Health and Society (3 cr)
Kin 5115—Event Management in Sport (3 cr)
Kin 5375—Competitive Sport for Children and Youth (3 cr)
Rec 2151—Outdoor and Camp Leadership (3 cr)
Rec 3541W—Recreation Programming (3 cr)
SpSt 3112—Applied Sport Science (2 cr)
SpSt 3631—Sport Promotion and Programming (2 cr)
SW 2001—Introduction to Social Welfare and Community Services (4 cr)
Soc 3111—Introduction to Crime and Criminal Justice (3 cr)
YoSt 2001—Introduction to Youth Studies (2 cr)
YoSt 5031—Youth in the World (3 cr)
YoSt 5402—Youth Policy: Enhancing Healthy Development in Everyday Life (3 cr)
Other courses may be included with the adviser's approval.

Technology Education

Department of Work, Community, and Family Education

B.S.

This program prepares students to meet Minnesota state licensure requirements for teaching technology education to grades 5-12.

The curriculum surveys the broad range of technology use and application in the areas of manufacturing, construction, transportation, communication, energy, and power. Coursework includes liberal education, technology education, and professional/clinical experiences and student teaching.

Graduate study in this field is available. A career and technical education certificate is also available; see the following page for more information.

Admission Requirements—Applicants may be admitted to this program with a 2.50 minimum overall GPA and completion of at least 60 credits, including credits in progress at the time of application.

Degree Requirements

Students must complete the University's liberal education requirements, including the writing intensive (W) requirement. Courses that meet these requirements may be found in the current *Class Schedule* or on the Web at <www.onestop.umn.edu/schedule/html/tc.html>. Students may complete their degree in four years by completing 15 credits each semester.

Students must have a total of 120 credits with a minimum 2.00 overall GPA to complete this program. A minimum 2.00 GPA with no grade lower than C- is required for major courses with the following designators: BIE, EdHD, HRD, and WCFE. A minimum grade of C- is also required for general psychology.

Required Courses

Comm 1101—Introduction to Public Speaking (3 cr)
or Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Math 1031—College Algebra and Probability (3 cr)
Psy 1001—Introduction to Psychology (4 cr)
or GC 1281—General Psychology (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or BA 3033W—Business Communication (4 cr)*

* Required course for students who are also completing a business minor through the University's Carlson School of Management

Technology Education (47 cr)

Technical Skills (36 cr)

BIE 3111—Exploring Technology Systems (3 cr)
BIE/AFEE 3112—Technical Drawing and Production Technologies (3 cr)
BIE 3113—Manufacturing Technology (3 cr)
BIE 3114—Construction Technology (3 cr)
BIE/AFEE 3121—Communication, Power and Energy, Transportation and Machinery Technologies (3 cr)
BIE 3122—Communication and Information Technology (3 cr)
BIE 3123—Energy, Power, and Transportation Technologies (3 cr)
BIE 3151—Technical Development: Advanced (1-30 cr)
BIE 5101—Technological Problem Solving (3 cr)
BIE 5151—Technical Development: Specialized (1-12 cr)
BIE 5344—Facilities Management in Business and Industry (3 cr)
BIE 5596—Occupational Experience in Business and Industry (1-10 cr)

Note: A limited number of technical college credits can be applied to BIE 3151 or BIE 5151.

Technological Knowledge (11 cr)

BIE 5011—Introduction to Computer Applications (3 cr)

or substitution approved by adviser

BIE 5365—Curriculum Development in Technology Education (3 cr)

HRD/WCFE 5661—Instructional Methods for Business and Industry Education: Advanced (2 cr)

WCFE 3011W—Introduction to Technology and Public Ethics (3 cr)

or WCFE 5011W—Technology and Public Ethics (3 cr)

Professional/Clinical Studies (24 cr)

Foundations of Education (12 cr)

EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)

EdHD 5003—Developmental and Individual Differences in Educational Contexts (3 cr)

EdHD 5005—School and Society (2 cr)

EdHD 5007—Technology for Teaching and Learning (1.5 cr)

EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)

PubH 3003/5003—Fundamentals of Alcohol and Drug Abuse (2 cr/1 cr)

Clinical Experience (12 cr)

WCFE 5696—Teaching Internship: Introduction (1 cr)

WCFE 5697—Teaching Internship: School and Classroom Settings (2 cr)

WCFE 5698—Teaching Internship (3-8 cr)

WCFE 5699—Teaching Internship: Extended Practice (1 cr) (May session)

First aid and cardiopulmonary resuscitation (CPR) certification must be current at the time of licensure completion.

Undergraduate Leadership Minor

Interdisciplinary

Minor Only

The undergraduate leadership minor is a 16-credit interdisciplinary program that helps students gain understanding and experience in multiple frameworks of leadership. The program develops the leadership and social change skills of undergraduates for their roles as citizens on the University campus and in the larger global community. This minor is a collaborative effort of the college's department of Educational Policy and Administration (EdPA), the University's Hubert H. Humphrey Institute, and the Office for Student Affairs.

Admission Requirements—To be admitted to this minor, students must complete EdPA 1301/PA1961 with a grade of at least S (or C- or higher).

Minor Requirements

Students must complete at least 16 credits in the following areas:

Core Courses (9 cr)

EdPA 1301W/PA 1961W—Personal Leadership in the University (3 cr)

EdPA 3302W—Leadership in the Community

or PA 3961W—Leadership, You, and Your Community (3 cr)

EdPA 4303W—Leadership in the World

or PA 4961W—Self-Developed Leadership in the World (3 cr)

Field Experience (2 cr)

These credits are designed with a leadership program adviser.

Electives (5 cr min)

Courses from other departments that have been approved by the leadership program's advisory team.

For more program information, contact June Nobbe in the Office for Student Affairs, 612-625-6531.

Certificates

Coaching

This program prepares students to coach sports in public schools and youth organizations. It also meets the certification requirements needed to be a head coach in Minnesota high schools. Admission is open to all University students. For more information, call the School of Kinesiology at 612-625-3500.

Disability Policy and Services

This program offers an interdisciplinary study of contemporary theories and practices of service delivery for people with disabilities. While focusing on the needs of people with all types of disabilities, the program emphasizes the needs of people with developmental disabilities.

Admission is open to individuals from the community as well as students enrolled in the graduate programs (Graduate School or professional studies) at the University of Minnesota. For more information, contact Marijo McBride, 612-624-6830 at the Institute on Community Integration (ICI).

Human Resource Development

Coursework includes study of adult education, personnel training, and organization development Admission to this certificate program is open to degree-seeking or non degree-seeking students or to individuals working in the HRD field who are seeking additional credentials. For more information about the program and monthly introduction sessions, contact Gary McLean (612-624-4901) at the Department of Work, Community, and Family Education (WCFE).

Sport Management

This interdisciplinary program offers specialized educational and professional preparation for careers in sport management. The program complements a student's academic program in business/management, kinesiology, recreation, or journalism.

Typical careers in sport management include sport organization management (budgeting, accounting, facility management), sport information management (marketing, promotion, advertising), and exercise and sport science or the "fitness/wellness" industry (testing, evaluating, and monitoring exercise and fitness programs). For more information, contact Bruce Anderson (612-625-4380) in the School of Kinesiology.

Career and Technical Education

This program prepares students to become instructors in technical and community colleges, allows current instructors to upgrade their teaching skills, or offers a credential for workplace advancement. Students may be either degree-seeking or non-degree -seeking students. For more information on this program, contact the WCFE Student Information Office at 612-624-1221.

This is the General College section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

General College


128

General College

General Information

Since 1992, the mission of General College (GC) has been to prepare students for transfer into baccalaureate degree programs at the University of Minnesota or other accredited colleges and universities. As one of eight freshman-admitting colleges at the University, GC admits students who are highly motivated to pursue a college education at a major research institution but do not meet the admission requirements of the University's other freshman-admitting colleges. Hallmarks of GC include its commitment to diversity, a challenging curriculum that prepares students to succeed when they transfer, and dedicated faculty, advisers, and staff who work together—making the college a national model in developmental education. Enrollment is approximately 1,600 students, with 875 new students joining the returning students each fall. Students enjoy access to the resources offered by a large, internationally-ranked research institution located in a major urban area as well as the personalized attention of a small college committed to providing high-caliber human and technological resources to its students. On the average, students admitted to GC transfer to a degree-granting college within the initial four semesters.

GC is primarily housed in Appleby Hall on the east bank of the Minneapolis campus.

Application/Admission

Application deadlines and admission policies and procedures are subject to change. For current information, contact the Office of Admissions at 612-625-2008, 800-752-1000, or <http://admissions.tc.umn.edu>.

New Student Orientation

After students are admitted to the University, they receive information from GC about steps that they need to take before they are invited to orientation. These steps include paying the confirmation fee, taking appropriate placement tests, and filling out a survey related to their academic plans. Once all steps are completed, the student receives an orientation date. All new students who enroll in GC must attend a two-day orientation session during which they register for classes. Orientation sessions are held in June and early July.

On the first day of orientation, students are introduced to resources, services, and programs at the University. Students also receive a copy of the *Class Schedule*, *General College Student Workbook*, and other registration materials. The *General College Student Workbook* offers information on the curriculum, liberal education requirements for the University, registration procedures and deadlines, information on academic progress, and guidelines for academic planning. The workbook also provides students with useful information about the college and the University, current policies and procedures, worksheets to help plan and prepare for registering for classes, and tips on how to be succeed in school.

On the second day of orientation, students have a one-hour individual appointment with an academic adviser to review their registration materials, interpret placement test results, and plan their first semester's schedule. Students then self-register for classes online.

Math Placement Assessment—All students admitted to GC must take a math placement assessment test before they can attend orientation and register for classes. This test can be completed online at <www.onestop.umn.edu/placement>. GC offers math courses for those who need to brush up on their basic math skills before attempting college-level math courses. For more information on GC's math placement assessment test, GC math courses, or college-level math courses, contact the Student Information Center at 612-625-3339 or gcinfo@umn.edu.

Curriculum

GC classes are small, with an excellent student-to-instructor ratio that allows students to receive more personalized attention. Most sections of freshman writing courses are limited to 18 students and taught in computer classrooms. Humanities, mathematics, and social science courses range from 30 to 40 students. Science courses range from 25 to 200 students in lectures, with smaller labs of 12 to 25 students. A high percentage of GC courses are taught by faculty who have received the University's prestigious H.T. Morse/Minnesota Alumni Association Award for Outstanding Contributions to Undergraduate Education. Thirty-one GC faculty have received the award since its inception in 1967.

Most GC courses meet the University's liberal education and writing intensive requirements and are transferable. Freshmen are required to take courses in composition, social science, natural science, and humanities. Courses are designed to teach content while also building skills in critical thinking, reading, writing, and computing. Many courses have a multicultural emphasis and incorporate innovative teaching methods.

GC also offers pre-college level, noncredit mathematics courses for any University student who needs them. Placement tests are used to determine the student's mathematics level. Students placed into advanced mathematics courses offered by the Institute of Technology may begin taking them while enrolled in GC.

Most students will be in GC for three or four semesters. During the first year, students take all GC courses (appropriate foreign language or mathematics courses excepted). In their third semester, students will take a combination of GC and non-GC courses and will generally apply for transfer to a degree-granting unit. The retention and transfer rates for new students entering GC are excellent. For students who entered the college in 2000, the first-year to second-year retention rate was 76.3 percent, comparing very favorably with other freshman-admitting colleges. Students starting in GC and transferring to CLA graduate at rates comparable to students who initially start in CLA.

Several GC courses are also offered through the College of Continuing Education, and some of these classes meet off campus. Complete information about these courses is available in the current *College of Continuing Education Catalog*.

The GC Curriculum

Research has shown that students who get off to a strong start in their first two terms of college are more likely to be successful in completing a college degree. To help accomplish this, GC provides a supportive learning environment for students through its curriculum—a selection of core lower division courses that (with the exception of mathematics) meet University graduation requirements and introduce students to core disciplines of college study in a supportive environment. In addition to innovative instructional methods, the curriculum includes early and continued monitoring of students' academic performance with timely advice to students about their progress and how to improve, if necessary. Students are expected to complete a variety of courses in writing, mathematics, natural sciences, social sciences, and humanities during their first year.

Policies

Registration Procedures—GC students must file a pre-registration agreement with an adviser each semester. Students are responsible for fulfilling that agreement, making sure that their registration is accurate, class hours do not conflict, course prerequisites have been met, and current courses are not equivalent to courses already completed.

GC Registration Policies—Students are expected to

- complete the following courses while enrolled in GC:
  - —mathematics (complete any preparation requirements not completed in high school)
  - —science (at least one course)
  - —social sciences (at least one course)
  - —humanities (at least one course)
  - —freshman composition (completion of GC 1421 and GC 1422)
- complete a GC course in an area of study (science, social sciences, or humanities) before taking a non-GC course in that area
- have a registration plan approved by their adviser each semester
- register for at least one GC course each semester of residence in GC after the first two semesters of enrollment (exceptions to this policy require adviser and college approval)

Students should discuss with their advisers registration in second language courses as part of their transfer planning.

For additional information concerning registration procedures, see the *General College Student Workbook*.

Holds—A registration hold is an electronic code that restricts a student's registration until the college or office that placed the hold either removes or temporarily releases it. A hold may be placed for a variety of reasons (poor academic progress, unpaid tuition or fees, lack of immunization records, overdue books, etc.) and can only be removed by the unit that placed it. There are three categories of GC holds: registration permission holds, academic progress holds, and transfer planning holds. These holds are not meant to punish students; instead they are meant to make sure that students receive advising assistance to select appropriate courses and make progress towards transferring into a baccalaureate degree program. GC places a hold on a student's record if

- an adviser's approval is required for registration;
- a completed transfer plan is not on file by the deadline (usually the fourth semester of enrollment);
- registration results in an accumulation of 60 credits or more (when students need to transfer to another college);
- the student is placed on academic probation; or
- the student is suspended.

Registration Changes—After the start of a semester, students must have their adviser approval holds released by their advisers if they wish to add to their registration.

Credit Value—GC noncredit (0xxx) courses do not count toward graduation, but do count within the semester and the academic year, at their credit-equivalence value, toward the minimum credit load requirements for financial aid eligibility and athletic eligibility. Noncredit courses are course-fee based, not tuition-based. See the *Class Schedule* for more information.

Grades—Noncredit course grades are posted, on the transcript, for the semester of their registration. They are also considered in GC's academic progress review, even though they do not affect the transcript's cumulative GPA.

Monitoring Academic Performance—GC instructors use *Academic Alert* forms each semester to alert students and their advisers to possible problems. Advisers use the information on these alerts to work with students to help resolve problems. Instructors also evaluate student progress in the middle of the term and notify students and their advisers of the results.

Academic Standing—All University students are expected to maintain a GPA of at least 2.00. Because GC prepares students for transfer, the advising staff reviews all students' academic progress every semester to determine academic status and progress. The three levels of academic status are good standing, academic probation, and academic suspension. Students' academic achievement and progress toward transferring to another college are reviewed each semester. GC students must earn a 2.00 GPA each term in addition to maintaining a cumulative GPA of 2.00.

Thirty-one General College faculty have received the Horace T. Morse-Alumni Association Award for Outstanding Contributions to Undergraduate Education. Five GC advisers have received the John Tate Award for Excellence in Undergraduate Advising.

Satisfactory Progress—Students who maintain GC's minimum academic requirements will continue in good standing. However, to successfully transfer to another college, students must meet that college's admission standards.

Academic Recognition—Each semester the college recognizes and honors all students whose academic performance placed them on either the Dean's List, the Dean's Scholars List, or the GC Scholars List by sending letters of congratulation and posting the lists in a display case in the main hallway of Appleby Hall. Students named to the Dean's List also have that honor noted on their transcript.

Dean's List Criteria:

- semester GPA of at least 3.67 (A-)
- completion of at least 12 A-F (not S-N) credits during the semester (*not* including noncredit 0xxx courses)

Dean's Scholars List Criteria:

- semester GPA of at least 3.67 (A-)
- completion of at least 12 A-F credits during the semester (including noncredit 0xxx courses)

GC's Scholars List Criteria:

- Semester GPA of at least 3.00 (B)
- Completion of at least 12 A-F credits during the semester (including noncredit 0xxx courses)

Academic Probation—GC monitors students on academic probation, giving individual help to students who have academic difficulty in one or more courses. Students not meeting the minimum 2.00 GPA for one semester are placed on probation for the following semester. Students on probation must meet with their adviser early in the semester to identify past problems and develop strategies for future success. Continued lack of academic progress results in suspension.

Academic Suspension—Students who fail to make satisfactory progress toward good standing (i.e., both the semester and cumulative GPA fall below 2.00), after having had the opportunity to receive help with their academic problems and time to show improvement, are suspended from the University. Students on suspension are not allowed to register for any University courses for one full academic year, but may seek readmission after one year.

Progress Toward Transfer—Students assess their progress toward transfer at the end of their first year by meeting with their adviser and completing a yearlong course plan and transfer plan. All students must participate in the Transfer Check-In Program sponsored by GC's Transfer and Career Center. Transfer Check-In provides information on majors and career assessment, and help in setting educational goals and preparing to transfer to another college.

Excessive Credits—Because GC's mission is to prepare students for transfer, students who complete 60 credits and have not transferred will receive a registration hold prohibiting further registration in GC. Any exception to this restriction is the decision of the assistant dean based upon an individual review of the request and usually requires a written agreement between the student and the proposed transfer college.

Transfer Requirements—Each college and major has different requirements for transfer. Consult the college and program sections of this catalog, an adviser, or the Transfer and Career Center in 127 Appleby Hall (612-624-4346) for the most current transfer information on specific colleges and majors.

The Transfer and Career Center has transfer guides, detailed information, and deadlines for applying to other colleges. Students are also encouraged to make early contact with the college they wish to transfer to and begin the official transfer process early in the semester preceding the semester they plan to transfer. *Transfer Application* forms are available in either 127 Appleby Hall or 200 Fraser Hall and must be completed and returned to the One Stop Student Services Center in 200 Fraser Hall before the deadline. Most University programs follow University transfer deadlines of March 1 and October 1 of each year. Students are notified by mail of their application status.

Transfer Outside the University—Procedures for transferring to colleges outside the University may be discussed with a GC adviser. Requirements vary, but community and four-year colleges accept most GC credits.

Advising

Each student is assigned a professional adviser and keeps the same adviser while enrolled in GC. Students can schedule individual appointments with their adviser or meet with their adviser during walk-in appointment times. The Student Information Center, 25 Appleby Hall, can assist students with advising questions.

First-year students must have adviser approval for registration, which they receive by attending a preregistration group meeting and then meeting individually with their adviser. Group planning opportunities are offered throughout the semester. During their second semester, students must complete a yearlong plan indicating their preliminary transfer and degree goals.

Special Learning Opportunities

Directed Study—Directed study is student-directed learning. Students, in collaboration with a faculty sponsor, determine what they want to learn, set goals, and design a course of study. To arrange for directed study, students must submit to the director of academic affairs a contract form that has been worked out in consultation with a faculty mentor. Contract forms are available in 140 Appleby Hall. Credits earned in directed study do not usually transfer to other units in the University without special review or petition.

Student Information Center—The Student Information Center, 25 Appleby Hall (612-625-3339), is often able to provide help or referrals in matters that do not require students to meet with an adviser. The center also schedules individual appointments with the college's advising staff. Students are encouraged to check the center's bulletin boards for regularly updated announcements and information about the college and University.

Transfer and Career Center (TCC)—TCC, 127 Appleby Hall (612-624-4346), has online interest-assessment inventories, computerized career guidance programs, and a resource library for students to explore majors, career interests, colleges to transfer to, scholarships, and financial aid.

Academic Resource Center (ARC)—ARC, 11 Appleby Hall, is a clearinghouse for GC tutorial services in several subject areas and offers computer access for GC students.

- The Computer Center provides free access for GC students to Windows and Macintosh computers.
- The Math Center provides free walk-in assistance to students taking courses through precalculus.
- The Writing Center has tutors who can help students with writing at any stage of completion. Help can be provided by one-to-one consultation in the center or through e-mail at writers@umn.edu.

Appointments are not necessary for any part of ARC.

Commanding English (CE)—CE is a yearlong program for GC freshmen for whom English is a second language. ESL support is built into a sequence of credit-bearing GC courses (academic reading, basic writing, speech, immigration literature, sociology, anthropology, biology). Placement into CE is based on an English proficiency test score of 65 to 79 on the MELAB or

145 to 207 on the TOEFL. Students should allow enough time in the GC application process to complete any TOEFL or MELAB testing requirements. For CE application information, contact the GC Student Information Center, 25 Appleby Hall (612-625-3339).

Student Parent HELP Center—The programs and services of the Student Parent HELP Center are designed to promote access, retention, and academic success for University students who are parents. Located in 133/135 Appleby Hall, the Student Parent HELP Center assists all undergraduate student parents in any college on the Twin Cities campus. In addition to advising, counseling, and advocacy services, the center's programs include child care funding, academic scholarships (limited to resources available), weekly peer support groups, special events and workshops, and an electronic newsletter. On-site services include a lounge and study room equipped with computers and printers. Full-time counselor-advocates assist with referrals and advocacy.

TRIO Programs—The following three TRIO programs are jointly funded by GC and the U.S. Department of Education.

Student Support Services (SSS)—SSS targets 100 to 120 new students each fall to participate in a multidimensional program that provides comprehensive academic support, supplemental study groups, learning communities, and leadership development. SSS students receive intensive advising and counseling, group and individual tutoring, and help with academic planning and career exploration. To be eligible for SSS, students must meet at least one of the following requirements: 1) be a first-generation college student (neither parent having a four-year degree), 2) meet income eligibility guidelines, or 3) have a physical or learning disability. For more information, contact SSS, 40 Appleby Hall, 128 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-0772).

Ronald E. McNair Program—The Ronald E. McNair Program prepares low-income, first-generation college students for graduate study. Services to program participants include academic counseling, tutoring, test preparation for the *Graduate Record Exam*, paid research internships, mentoring, advocacy and help in applying to graduate schools, plus seminars to help prepare for graduate study. Applications are available in 40 Appleby Hall, or call 612-625-0772.

Upward Bound—Upward Bound provides college preparation for low-income, high school students whose parents have not earned a college degree. Reading, writing, and mathematics skills are emphasized in the academic segment of the program; theatre, art, athletics, and experiential educational activities constitute the creative and recreational components. In addition to completing a six-week summer residential academic program, Upward Bound students participate in an academic year program of coursework and tutoring. Upward Bound is located in 2 Appleby Hall (612-626-1665).

Research and Outreach

Center for Research on Developmental Education and Urban Literacy (CRDEUL)—CRDEUL provides a forum for the development and support of research projects in developmental education and urban literacy, connects individuals from campus and community organizations who are interested in collaborative research, and increases the presence and visibility of this work through publications and forums. For more information, call 612-626-8706 or visit the Web site at <www.gen.umn.edu/research/crdeul/>.

Day Community—Day Community is a community mental health program that provides therapeutic, educational, and experiential learning services to metropolitan-area at-risk youth. Day Community also provides University students with opportunities for internships and work experiences. Day Community is located at 2700 Sumner St. N.E., Minneapolis, MN 55413 (612-627-4107).

Center for Experiential Learning (CEL)—CEL provides experientially based educational and therapeutic youth development services as well as professional training and consultation services. CEL also provides University students with opportunities for internships and work experiences. CEL is located at 2700 Sumner St. N.E., Minneapolis, MN 55413 (612-627-4303).

Native American Math and Science Summer Camp—The camp encourages Native teenagers to study math and science through traditional Native uses of the sciences and mathematics. The camp is cosponsored by GC, the student chapter of the American Indian Science and Engineering Society, the Office of Multicultural Affairs, Academic Affairs, the Department of Civil Engineering, Two Feathers Fund, and other partners. For more information, call 612-626-8665 or visit the Web site at <www.gen.umn.edu/nativecamp/>.

International Programs

GC strongly encourages students to consider international study experiences. Such experiences can strengthen students' applications for transfer to other colleges; prepare students for multicultural workplaces within a global economy; and contribute to students' self-confidence, knowledge of the world, and understanding of their own culture. Students usually earn full credit toward their degree and are able to apply their financial aid to study abroad. To explore these options, students should contact the Global Campus, 230 Heller Hall (612-626-9000).

General College is an award-winning national leader in the practice and theory of developmental education.

Career Information

The GC Transfer and Career Center in 127 Appleby Hall (612-624-4346) is staffed by professional counselors who help students explore educational, occupational, and career opportunities. Students may schedule an appointment or use the center's walk-in services.

Career and Personal Development Focus—

- assessing, testing, and evaluating career possibilities (Strong Interest Inventory)
- decision making and career development
- choosing a major and a college for transfer
- increasing motivation

Transfer Plan Check-In (mandatory for students who have completed two or more semesters)—

- preparing a transfer plan
- transfer deadlines and applications
- making appointments with visiting adviser liaisons
- referrals to University of Minnesota transfer specialists

Career Search Resources—

- career resource library
- University of Minnesota "Majors Information" files
- computerized career guidance programs (Discover, MCIS, Strong Interest Inventory)
- study abroad, internship, scholarship information
- workshops on goals, majors, and careers
- transfer planning programs (such as Majors Information Week)

Student Organizations and Scholarships

The GC Student Board is a student government association that represents the student body and is funded by student services fees. The Student Board sponsors several events for GC students each year. Student Board members are GC students who have a strong commitment to students and the future of the GC community. Membership on the Student Board is open to all GC students. Former GC students may be alumni members. For more information on becoming a Student Board member, stop by the Student Information Center, 25 Appleby Hall (612-625-3339).

TRIO students may serve on the TRIO Student Advisory Board. Contact the TRIO office, 40 Appleby Hall (612-626-6015).

The Student Parent HELP Center holds a weekly discussion and support group for student parents. For more information, come to 133 Appleby (612-625-5307).

Three scholarship funds, made possible by contributions from alumni and friends of GC—the General College Scholarship, the Fred L. Estes Family Scholarship, and the Virginia Binger Scholarship—reward high academic achievement, support low-income African American students, and support low-income student parents, respectively. For more information, contact the GC dean's office, 109 Appleby (612-625-6885).

Directory

(area code 612)

General College Administration

Office of the Dean
109 Appleby Hall
625-6885
626-7848 (fax)
David V. Taylor, dean
Avelino Mills-Novoa, assistant dean and director of student services

Academic Affairs and Curriculum

240 Appleby Hall
625-2880
Terence Collins, director

Academic Service Center
140 Appleby Hall
626-8705
625-0709 (fax)

Technical Support Services
211 Appleby Hall
625-3413

Office of Research and Evaluation
149 Appleby Hall
624-5761

Student Services

Student Information Center
(adviser appointments; general information on admissions, orientation, advising, programs, and services)
25 Appleby Hall
625-3339
625-0704 (fax)
626-1014 (TTY)
<www.gen.umn.edu/student/student_info_ctr.htm>

College Registrar
33 Appleby Hall
626-7141

Academic Resource Center (ARC)
11 Appleby Hall
626-1328

Math Center
9 Appleby Hall
626-7572
<www.gen.umn.edu/resources/arc/mathcenter.htm>

Writing Center
11 Appleby Hall
624-0342
<www.gen.umn.edu/resources/arc/writing_center.html>

Transfer and Career Center (TCC)
127 Appleby Hall
624-4346
<www.gen.umn.edu/transfer_career_ctr/>

GC Student Board
20 Appleby Hall
625-6004

Affiliated Programs

Center for Experiential Learning
2700 Sumner St. N.E.
Minneapolis, MN 55413
627-4303

Commanding English Program
233 Appleby Hall
625-3514

CRDEUL (Center for Research on Developmental Education and Urban Literacy)
333 Appleby Hall
626-8706

McNair Program
40 Appleby
625-0772
625-0704 (fax)

Student Parent HELP Center
133 Appleby Hall
625-5307
626-9867 (fax)
<www.gen.umn.edu/programs/help_center>

TRIO/Student Support Services
40 Appleby
625-0772
625-0704 (fax)

University Day Community
2700 Sumner St. N.E.
Minneapolis, MN 55413
627-4107
627-4195 (fax)

Upward Bound
2 Appleby Hall
626-1665
625-0704 (fax)

GC on the Web
<www.gen.umn.edu>

College of Human Ecology

This is the College of Human Ecology section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Degree Programs and Minors

College of Human Ecology

General Information

Knowledge transforming people…. People transforming lives

The College of Human Ecology (CHE) offers eight undergraduate programs that examine the interaction of humans and their environments—the natural, designed, and social environments. CHE studies families, communities, shelter, interior design, graphic communication, clothing, retailing and consumer behavior, nutrition, and food science. The college offers top-ranked degree programs for undergraduates (1,000 students) and graduates (350 students).

CHE builds on more than a century of excellence and the strengths of four units: Design, Housing, and Apparel; Family Social Science; Food Science and Nutrition; and the School of Social Work.

The undergraduate programs are professionally focused and guided by faculty who make working with undergraduate students a top priority. Faculty members have close working relationships with industry professionals from the community who collaborate on discovery and outreach, participate in special programming, and serve as a network for students seeking internships and post-graduation opportunities. All CHE programs require or offer internships. Students are encouraged to take advantage of the college's significant scholarship endowment as well as apply for special grants that promote professional development experiences.

McNeal Hall, on the St. Paul campus, houses the administrative offices and provides outstanding facilities for CHE's teaching and research programs. All department offices are located on the St. Paul campus. All locations provide access and facilities for persons with disabilities.

Admission

All applicants to CHE must have completed three years of high school mathematics, including one year each of elementary algebra, geometry, and intermediate algebra. Admission to CHE majors is competitive, and space is limited.

Freshmen—See Freshman Admission in the General Information section of this catalog and refer to the University of Minnesota, Twin Cities undergraduate application booklet for freshman admission requirements.

Transfer Students—Complete high school preparation requirements, including one year each of algebra, geometry, and intermediate algebra. Required transfer grade point average (GPA) varies by program, as does space availability. Please check with the CHE college office for more information.

Transfer Advising—Students who wish to transfer to CHE may contact a transfer specialist by calling 612-624-1725. For more information, see Transfer Admission in the General Information section of this catalog.

Visiting CHE

CHE encourages prospective students to meet with an adviser for more information about the college's programs; tour the facilities, including the state-of-the-art computer lab and design studios; and discuss internship and career opportunities. To arrange a visit, students should call 612-624-1717. Visit the CHE Web site at <www.che.umn.edu/>.

Degrees/Majors

The major programs in CHE all lead to the bachelor of science degree.

CHE is organized into four major departments and schools that provide the courses and faculty for the college's academic and professional programs:

Department of Design, Housing, and Apparel
- Clothing Design
- Graphic Design
- Housing Studies
- Interior Design
- Retail Merchandising

Department of Family Social Science
- Family Social Science (minor available)

Department of Food Science and Nutrition
- Food Science (minor also available)
- Nutrition (minor also available)

School of Social Work
- Family Violence Prevention (minor only)
- Youth Studies (minor only)

Graduate Degrees—Through the Graduate School, the master of arts, master of fine arts, master of science, master of social work, and doctor of philosophy degrees are offered in design, housing, and apparel; family social science; food science; nutrition; and social work. For information about these programs, students should consult the *Graduate School Catalog* or call 612-624-3014.

Minors

CHE offers five minors: family social science, family violence prevention, food science, nutrition, and youth studies. All are explained in the following Degree Programs and Minors section.

Design is offered as a university-wide minor. See the listing in this catalog under the College of Architecture and Landscape Architecture.

Honors

The lower division honors program offers freshmen and sophomores an opportunity to form close relationships with faculty, to explore new ideas, and to share their ideas, interests, and lives on a daily basis. Students develop these relationships by participating in honors classes and by living in Honors Housing in residence halls on campus. Lower division honors students complete three honors learning experiences and receive a certificate of completion at the annual CHE honors and awards programs.

CHE's Goldstein Museum—the only design-oriented museum in the Big 10—is an internationally recognized teaching and research center that houses a collection of more than 12,500 objects, including historic and contemporary costumes, textiles, and decorative arts.

The upper division honors program offers juniors and seniors additional opportunities to achieve their academic and professional goals. Upper division students complete two honors learning experiences and carry out a capstone project, an in-depth exploration of a topic specifically related to their major. Students successfully completing the upper division honors program are eligible to graduate with Latin honors (*cum laude, magna cum laude,* or *summa cum laude*).

For more information, students should contact the CHE honors adviser, 32 McNeal Hall (612-624-1717) or check the Web site at <www.che.umn.edu/ss>.

Policies

CHE Students are responsible for complying with University policies. See the Policies section of this catalog.

Academic Recognition—Each semester the college recognizes and honors all students whose academic performance places them on the dean's list by sending letters of congratulation and posting the list in a display case in the main hallway of McNeal Hall. Dean's list criteria are described in the Policies section of this catalog.

Academic Progress—CHE students are expected to make satisfactory and timely progress in their degree programs and are held to the University's academic progress standards. See the Policies section of this catalog. In addition, studio major programs in CHE require students to maintain a 2.50 cumulative GPA in order to go through portfolio review and move from pre-major to major status. If a cumulative GPA falls below 2.50, the student is notified and required to meet with an academic adviser each term before registering.

Academic Probation and Suspension—See Probation in the Policies section of this catalog. CHE views probation as a means to intervene on the student's behalf before his or her academic situation becomes worse. Students on probation are required to meet with their adviser before registering for the next term and are encouraged to meet with the adviser throughout the semester to identify issues and develop strategies for academic success.

Course Cancellation—Students are permitted one discretionary course cancellation, or withdrawal, after the cancellation deadline but before the study day. For more information, see the Policies section in this catalog.

Other late cancellations are approved by the Student Scholastic Standing Committee only when verified extenuating circumstances arise that prevent a student from completing a course after the cancellation deadline. Any cancellation, discretionary or otherwise, after the cancellation deadline must be requested by written petition to the CHE Student Scholastic Standing Committee, 32 McNeal Hall. General course cancellation procedures are described in the *Class Schedule* each semester.

Credit Load—To carry more than 20 credits, a student must have a 3.00 cumulative GPA and must obtain permission from the Student Scholastic Standing Committee, 32 McNeal Hall.

Holds—General information about holds (negative service indicators) can be found in the *Class Schedule*. Registration holds from the college ensure that students receive appropriate advising for course selection and progress toward their degree. CHE will place a registration hold on a student's record if:

- A term GPA is below 2.00.
- A student is a design major who does not have the minimum cumulative GPA of 2.50 to go through portfolio review.
- A student is suspended.
- A student has returned from suspension and is under an academic contract.

This prohibits students from registering without academic adviser permission.

Petitions—To request permission to depart from department or college requirements or policies, students must complete a petition form available at the college office, 32 McNeal Hall. They should meet with their academic adviser to discuss the petition, and if the adviser supports and signs the petition, the student then submits it along with a current transcript to the Student Scholastic Standing Committee, 32 McNeal Hall. The decision will be mailed to the student. Appeals for petitions that are not approved may be directed to the associate dean for academic affairs, 32 McNeal Hall.

Academic Integrity—CHE students are expected to behave responsibly and ethically. CHE students, faculty, and staff work together to create and sustain a climate of open and scholarly debate. CHE faculty act on cases involving alleged academic dishonesty (cheating), which may result in modification of a course grade. Instructors must report any action to the college office, and the student is informed of the right to ask for a committee hearing.

Student Scholastic Standing Committee—CHE's Student Scholastic Standing Committee, composed of administrators and college office staff, interprets and enforces college and University regulations relating to academic affairs. It handles requests for exceptions to registration policies and procedures, transfer of credit policies, and some degree requirements. The committee administers the college probation system, monitoring students' performance and dealing with questions of probation, suspension, and readmission.

The committee seeks to maintain the spirit of CHE's regulations as flexibly as possible and is empowered to make exceptions in cases in which regulations work to students' educational disadvantage.

Students are urged to consult a committee representative in their college office concerning almost any kind of problem, but especially those they think interfere with their ability to attain their academic objectives. Well-established petition and appeal procedures assure full review of student requests.

Graduation Requirements

University graduation requirements are listed in the Policies section of this catalog.

Commencement—CHE holds official commencement exercises once a year in the spring. Students who have applied to graduate are provided information about commencement.

Scholarships

CHE scholarships of up to $5,000 per year are awarded to new and continuing students based on academic performance, leadership and service, and financial need. Students are encouraged to apply early for scholarships. Also available through CHE are travel study grants and awards for undergraduate research programs and special development opportunities. Scholarship information, deadlines, and applications are available in the college office, 32 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-624-1717) or <www.che.umn.edu/ss/>.

International Programs

CHE encourages students to participate in an international study experience as part of their degree program. Several specialized programs are available, including a three-week summer interior design program in Europe (offered even-numbered years). See also Study Abroad in the General Information section of this catalog.

Advising

Upon being admitted to CHE, students are assigned an academic adviser, usually during New Student Orientation.

Design, Housing, and Apparel Students—Students enrolled in pre-clothing design, pre-graphic design, pre-interior design, clothing design, graphic design, interior design, housing studies, and retail merchandising should call 612-674-9700 for adviser information or to make an appointment.

Family Social Science Students—Students enrolled in family social science should call 612-625-2252 or 625-1282 for adviser information or to make an appointment.

Food Science and Nutrition Students—Students enrolled in food science and nutrition should call 612-624-6753 for adviser information or to make an appointment.

The Student Services office in 32 McNeal Hall provides assistance with college-wide procedures and policies to currently enrolled students. To make an appointment, students should contact the college office, 32 McNeal Hall (612-624-4244).

Career Information

The Career Services Center, 12 McNeal Hall (612-624-6762), offers individual counseling and programming, and maintains a Career Resource Library and Web site to help students clarify career goals, secure and fund internships, and plan for a proactive job search. Staff members are available to discuss career choices and employment opportunities. Jobs and internships are posted online and in the center. During the academic year, the center sponsors programs dealing with various career-planning topics.

An important part of the college experience is participating in an internship. Most CHE programs require students to participate in a preplanned internship experience and other programs strongly encourage it. Internship credits vary, depending on program area. The Career Services Center acts as a clearinghouse for internship information.

For questions concerning career planning, internships, and job opportunities, call the Career Services Center (612-624-6762).

Student Organizations

College of Human Ecology Student Ambassadors

- promote the college to prospective students,
- provide assistance to current students,
- participate in college leadership and activities, and
- build community through energetic and fun programs.

The CHE Student Ambassadors sponsor and organize the Human Ecology Student Hospitality Room during freshman orientation and provide representation on other campus-wide student organizations and college committees.

Student Participation on College Committees—Every standing committee and every program committee in CHE has two or more student members on its roster.

Other CHE Student Organizations—Many of the undergraduate programs sponsor student organizations. Honor societies periodically invite selected students to join. Faculty adviser and officer names for the following organizations are available at the front desk, 32 McNeal Hall (612-624-1717).

Student and Professional Organizations

- American Institute of Architects
- American Society of Interior Designers
- Family Social Science Roundtable
- Food Science and Nutrition Club
- Graphic Design Club
- Housing Organization for University Students
- Human Ecology Student Ambassador Board
- Illuminating Engineering Society
- Institute of Business Designers
- International Interior Design Association
- Twin Cities Style Association
- Student Organization of Nutrition and Dietetics

Honor Societies

Phi Upsilon Omicron—This national honor society in family and consumer sciences has over 80,000 members across the United States. Its purposes are to recognize and encourage academic excellence, develop qualities of professional and personal leadership, provide opportunities for service to the profession, and encourage professional and personal commitment in order to advance family and consumer sciences and related areas.

St. Paul Campus Board of Colleges—This board directs and coordinates student activities and encourages student leadership throughout the St. Paul campus. Its membership is drawn from all major areas of the colleges of Agricultural, Food, and Environmental Sciences; Biological Sciences; Human Ecology; Natural Resources; and Veterinary Medicine.

The board cooperates with the Minnesota Student Association and the Assembly Committee on Student Affairs. It brings questions from the student body to the administration of its member colleges and discusses and reaches decisions on matters of general interest. CHE students may file for election to the board. Interested students should inquire at the Student Affairs office, 197 Coffey Hall (612-625-6274).

St. Paul Student Center Board of Governors—Students representing the academic units on the St. Paul campus are elected to the Board of Governors, which formulates policy for the operation of the St. Paul Student Center and establishes its budget. For information about the Student Center, its operation, and its various planning and programming committees, inquire at the information desk, 42 St. Paul Student Center.

Directory

(area code 612)

CHE Administration

32 McNeal Hall
1985 Buford Avenue
St. Paul, MN 55108
624-1717
<www.che.umn.edu>

Admissions/Prospective Student Services
624-1717

Career Services Center
624-6762

Student Services
624-4244

Transfer Credits
624-1725

Departments

Design, Housing, and Apparel
240 McNeal Hall
624-9700

Family Social Science
290 McNeal Hall
625-1900

Food Science and Nutrition
225 Food Science and Nutrition
624-1290

School of Social Work
105 Peters Hall
625-1220

Stop by Career Services in 12 McNeal Hall to sign up for "eRecruiting," the online job and internship resource for CHE students.

Clothing Design

Department of Design, Housing, and Apparel

B.S.

In the clothing design program students develop an understanding of the textile and clothing product development process including design, production, and marketing. Students are challenged to integrate knowledge of the product with consumer needs and business constraints.

The program emphasizes and integrates creative thinking and technical skill. Students become proficient in manual and computer methods of pattern development and implement apparel structuring methods appropriate for custom design or industry production. Courses cover costume history, social and cultural meanings of apparel, the textile and apparel consumer, and aesthetics. A required internship ensures that students gain professional experience.

Students entering the program should have clothing construction/assembly competence and a working knowledge of microcomputers and software. Students are encouraged to use the liberal education categories to explore multicultural themes and to strengthen knowledge that supports their major coursework.

Graduates of the program work in various settings, including product development and quality assurance for large retail companies, product design for small and large manufacturers, theatre and film design, wearable art, and custom design.

Admission Requirements—Freshmen and transfer students are initially admitted as pre-clothing design majors.

After being admitted to CHE, students must meet the following criteria to achieve full major status in the clothing design program:

- Demonstrate competence in basic clothing construction skills by either passing the DHA sewing proficiency examination or successfully completing DHA 1221.
- Complete DHA 1101W, 1201, 1311, 1312, and 2221.
- Maintain overall GPA of at least 2.50.
- Receive positive assessment of design work through portfolio review.

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements. They must maintain an overall GPA of at least 2.00, including a grade of C- or better in all required professional courses in the major.

Required Courses

DHA 1101W—Introduction to Design Thinking (4 cr)
DHA 1201—Clothing Design, Merchandising, and the Consumer (3 cr)
DHA 1311—Foundations: Drawing and Design in Two and Three Dimensions (4 cr)
DHA 1312—Foundations: Color and Design in Two and Three Dimensions (4 cr)
DHA 2211—Illustration for Clothing Design (2 cr)
DHA 2213—Textile Analysis (4 cr)
DHA 2221—Clothing Design Studio I (4 cr)
DHA 2222—Clothing Design Studio II (4 cr)
DHA 3217—Fashion: Trends and Visual Analysis (3 cr)
DHA 3223—Clothing Design Studio III (4 cr)
DHA 3224—Clothing Design Studio IV (4 cr)
DHA 3312—Color and Form in Surface Design (3 cr)
DHA 4121—History of Costume (4 cr)
DHA 4196—Internship in DHA (3 cr)
DHA 4212W—Dress, Society, and Culture (3 cr)
DHA 4215—Product Development: Softlines (4 cr)
DHA 4225—Clothing Design Studio V (4 cr)
DHA 4226—Clothing Design Studio VI (4 cr)
DHA 4330—Surface Fabric Design Workshop (4 cr)
or DHA 4340—Woven and Non-Woven Fiber Design Workshop (4 cr)
DHA 5216—Textile and Apparel Consumer (3 cr)
or DHA 4217—International Developments in Textiles and Apparel (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Sample Program

Freshman Year

Fall Semester
DHA 1201—Clothing Design, Merchandising, and the Consumer (3 cr)*
DHA 1311—Foundations: Drawing and Design in Two and Three Dimensions (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Liberal education elective (4 cr)

Spring Semester
DHA 1101W—Introduction to Design Thinking (4 cr)*
DHA 1221—Clothing Assembly Fundamentals (4 cr)
or pass sewing proficiency exam
DHA 1312—Foundations: Color and Design in Two and Three Dimensions (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Liberal education elective (4 cr), if not taking DHA 1221

Sophomore Year

Fall Semester
DHA 2213—Textile Analysis (4 cr)
DHA 2221—Clothing Design Studio I (4 cr)
Liberal education electives (7 cr)

Spring Semester
DHA 2211—Illustration for Clothing Design (2 cr)
DHA 2222—Clothing Design Studio II (4 cr)
DHA 3312—Color and Form in Surface Design (3 cr)
Liberal education electives (7 cr)

Junior Year

Fall Semester

DHA 3217—Fashion: Trends and Visual Analysis (3 cr)
DHA 3223—Clothing Design Studio III (4 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
Liberal education elective (4 cr)

Spring Semester

DHA 3224—Clothing Design Studio IV (4 cr)
DHA 4121—History of Costume (4 cr)
DHA 4215—Product Development (4 cr)
DHA 4330—Surface Fabric Design Workshop (4 cr)
or DHA 4340—Woven and Nonwoven Fiber Design (4 cr)

Senior Year

Fall Semester

DHA 4196—Internship (3 cr)
DHA 4217—International Developments in Textiles and Apparel (4 cr)*
or DHA 5216—Textile and Apparel Consumer (3 cr)
DHA 4225—Clothing Design Studio V (4 cr)
Liberal education elective (3 cr)

Spring Semester

DHA 4212W—Dress, Society, and Culture (3 cr)*
DHA 4226—Clothing Design Studio VI (4 cr)
Liberal education electives (7 cr)

**Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Family Social Science

Department of Family Social Science

B.S.

Family social science is a multidisciplinary major for those who are interested in helping people, counseling, and understanding human relationships. This major prepares graduates for careers in working with individuals, families, or systems in human services. Students incorporate into the major a family-oriented area of learning that focuses on a special population, issue, or complementary discipline. The major is enhanced by a required internship related to the student's specific program and career goals. Qualified graduates may continue their education through graduate study in family social science, child and human development, social work, or allied health disciplines.

Admission Requirements—The program admits freshmen and transfer students.

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements, and maintain an overall GPA of at least 2.00. All required courses must be taken A-F and completed with a grade of at least C-.

Required Courses

Preparatory Requirements

One economics course (3-4 cr)
One statistics course (3-4 cr)
Choose one course from one of the following areas (3-4 cr): child psychology, human development, psychology, sociology, political science, social work, anthropology, or FSoS 1101
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Major Core Studies Requirements

FSoS 2101—Preparation for Working with Families (2 cr)
FSoS 3101—Personal and Family Finances (3 cr)
FSoS 3102—Family Systems and Diversity (3 cr)
FSoS 4101—Sexuality and Gender in Families and Close Relationships (3 cr)
FSoS 4102—Global and Diverse Families (3 cr)
FSoS 4103—Family Policy (3 cr)
FSoS 4104W—Family Psychology (3 cr)
FSoS 4105—Methods in Family Research (3 cr)
FSoS 4106—Family Resource Management (3 cr)
FSoS 4296—Field Study: Working with Families (4 cr)
or FSoS 4294—Research Internship (4 cr required)

Advance Core Electives

Select two courses from the following (5 cr min): FSoS 4150, FSoS 4152, FSoS 4153, FSoS 4154, FSoS 4155, FSoS 4156

Applied Area of Study

21 cr of 3xxx, 4xxx, and 5xxx courses.

Students integrate a family-oriented application area in consultation with their adviser. The area may focus on a population such as children, adolescents, women, gay/lesbian persons, or immigrants; an issue such as family economics, gerontology, alcohol and substance abuse, health, sexuality, human rights, war, or violence; a complementary discipline such as social psychology, public health, education, sociology, or social work; or a skills area such as family research, advocacy, or policy development.

Students considering graduate school are strongly encouraged to focus on statistics, theory/research-oriented thought, and research experiences for their application area.

Family Social Science Minor

Required Courses

FSoS 1101—Intimate Relationships (3 cr)
FSoS 3102—Family Systems and Diversity (3 cr)

Elective Courses—Select three courses from the following:

FSoS 3101—Personal and Family Finance (3 cr)
FSoS 3426—Alcohol and Drugs: Families and Culture (3 cr)
FSoS 4101—Sexuality and Gender (3 cr)
FSoS 4102—Global and Diverse Families (3 cr)
FSoS 4103—Family Policy (3 cr)
FSoS 4104W—Family Psychology (3 cr)
FSoS 4106—Family Resource Management (3 cr)
FSoS 4152—Gay, Lesbian, and Bisexual Persons in Families (3 cr)
FSoS 4154—Families and Aging (3 cr)
FSoS 4155—Parent-Child Relationships (3 cr)

Sample Program

Freshman Year

Fall Semester

FSoS 1101—Intimate Relationships (3-4 cr)*
or one course from one of the following areas: child psychology, human development, psychology, sociology, political science, social work, or anthropology
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Liberal education electives (7 cr)

Spring Semester

Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Approved statistics course
Liberal education electives (9-10 cr)

Sophomore year

Fall Semester

Econ 1101—Principles of Microeconomics (4 cr)*
or ApEc 1101—Principles of Microeconomics (3 cr)*
FSoS 2101—Preparation for Working with Families (2 cr)
FSoS 3101—Personal and Family Finance (3 cr)
Liberal education electives (7 cr)

Spring Semester

FSoS 3102—Family Systems and Diversity (3 cr)*
Liberal education electives (12 cr)

CHE faculty are nationally recognized scholars on homelessness, cultural and social implications of dress, marriage and family, the effect of diet on cancer, at-risk youth, and child welfare.

Junior Year

Fall Semester

FSoS 4102—Global and Diverse Families (3 cr)
FSoS 4103—Family Policy (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
Applied area of study course (3 cr)
Liberal education elective (3 cr)

Spring Semester

FSoS 4104W—Family Psychology (3 cr)*
FSoS 4105—Methods in Family Research (3 cr)
Applied area of study courses (6 cr)
Liberal education elective (3)

Senior Year

Fall Semester

FSoS 4101—Sex and Gender in Families and Close Relationships (3 cr)
FSoS 4106—Family Resource Management (3 cr)
Advanced core elective (3 cr)
Applied area of study courses (6 cr)

Spring Semester

FSoS 4296—Field Study: Working with Families (4 cr)
or FSoS 4294—Research Internship (4 cr)
Advance core elective (3 cr)
Applied area of study courses (6 cr)
Liberal education elective (3 cr)

**Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Family Violence Prevention

Interdisciplinary

Minor Only

The family violence prevention minor is a 15-credit undergraduate program for students interested in strengthening their educational experience with a research base and a set of practical skills in family violence prevention. It is an intensive, interdisciplinary learning experience for students in all fields of study.

Courses are in fields related to social services, education, health care, and other direct services addressing issues related to child abuse and neglect, adult domestic violence, elder abuse, and intergenerational abuse. Students will learn theories and research related to violent behavior, examine relationships between violence in society and violence within families, and explore different professional responses to violence. Elective courses provide the opportunity to integrate these concepts into further study within a major or in other fields of interest.

Required Courses

SW 3706—Family Violence and Prevention: Exploring the Issues (3 cr)
SW 3402—Child Abuse and Neglect: Intervention and Prevention (3 cr)
SW 3705—Gender Violence in Global Perspective (3 cr)
Six additional credits from departments throughout the University of Minnesota. For information, call 612-624-4905 or look for this minor on the Web site <www.ssw.che.umn.edu> under Centers and Projects.

Food Science

B.S.

Food science is the application of science to the study of food. Chemistry, microbiology, physics, and engineering are scientific disciplines involved in food science.

- Chemistry—because foods undergo chemical reactions when they are heated, frozen, mixed with each other, and stored.
- Microbiology—because many foods are made by microorganisms (e.g., bread, cheese, yogurt, sauerkraut, tempeh) and because microorganisms cause extensive, rapid, and often dangerous spoilage.
- Physics and engineering—because foods must be constructed, moved through the factory, made safe, and distributed intact to the consumer.

Food science involves creating new food products and making current products more stable, nutritious, convenient, reliable, and safe. Food science begins with an understanding of the plants and animals that will become food, and ends with an understanding of why people choose to eat the foods they eat.

The food science program is a collaborative partnership between CHE and the College of Agricultural, Food and Environmental Sciences.

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements, and maintain an overall GPA of at least 2.00. All required courses must be taken A-F, and FScN courses must be completed with a grade of at least C-.

Required Courses

Foundation Courses

BioC 3021—Biochemistry (3 cr)
or BioC 4331—Biochemistry I (4 cr)
and BioC 4332—Biochemistry II (4 cr)
Biol 1009—General Biology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Math 1271—Calculus I (4 cr)
Math 1272—Calculus II (4 cr)
MicB 3301—Biology of Microorganisms (5 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
Select one of the following physics series: Phys 1101/1102, Phys 1201/1202, Phys 1301/1302. ***Note:*** Phys 1301 and 1302 are recommended.
Select one of the following laboratory skills courses: BioC 4025, Chem 2111, Chem 2311,
FScN 4613

Professional Courses

FScN 1102—Food: Safety, Risks, and Technology (3 cr)
FScN 1112—Principles of Nutrition (3 cr)
FScN 3102—Introduction to Food Science (3 cr)
FScN 4111—Food Chemistry (3 cr)
FScN 4121—Food Microbiology and Fermentations (3 cr)
FScN 4122—Laboratory Methods in Microbiology and Fermentations (2 cr)
FScN 4131—Food Quality (3 cr)
FScN 4312—Food Analysis (4 cr)
FScN 4331—Food Process Engineering I (3 cr)
FScN 4332—Food Process Engineering II (4 cr)
One of the following FScN courses with a capstone component: FScN 4341, 4342, 4343, 4344, 4345, 4346

Food Science Minor

Complete at least 20 FScN credits from the following list: FScN 1102, 3102, 4111, 4121, 4122, 4131, 4312, 4331, 4332

Sample Program

Freshman Year

Fall Semester

Chem 1021—Chemical Principles I (4 cr)*
FScN 1102—Food: Safety, Risks, and Technology (3 cr)*
Math 1271—Calculus I (4 cr)*
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)

Spring Semester

Biol 1009—General Biology (4 cr)*
Chem 1022—Chemical Principles II (4 cr)*
Math 1272—Calculus II (4 cr)
Liberal education elective (4 cr)

Sophomore Year

Fall Semester

Chem 2301—Organic Chemistry I (3 cr)
FScN 3102—Introduction to Food Science (3 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Phys 1301W—Introductory Physics for Science and Engineering I (4-5 cr)*

Spring Semester

BioC 3021—Biochemistry (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Phys 1302—Introductory Physics for Science and Engineering II (4-5 cr)
MicB 3301—Biology of Microorganisms (5 cr)

Junior Year

Fall Semester

FScN 1112—Principles of Nutrition (3 cr)*
FScN 4111—Food Chemistry (3 cr)
FScN 4331—Food Process Engineering I (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)*
Liberal education electives (4 cr)

Spring Semester

FScN 4121—Food Microbiology and Fermentations (3 cr)
FScN 4122—Laboratory Methods in Food Microbiology and Fermentations (2 cr)
FScN 4332—Food Process Engineering II (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)*
Liberal education electives (2-3 cr)

Senior Year

Fall Semester

FScN 4131—Food Quality (3 cr)
FScN 4312—Food Analysis (4 cr)*
Laboratory skills course
Liberal education electives (6 cr)

Spring Semester

FScN 4xxx elective course with capstone component (3-4 cr)
Liberal education electives (11-12 cr)

**Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Graphic Design

Department of Design, Housing, and Apparel

B.S.

The graphic design program educates students in design methods, design theory, creative problem solving, and visual and verbal literacy. An emphasis is placed on visual components: how humans communicate, perceive, interpret, and understand visual information. The program fosters flexibility, which enables graduates to adapt to social, cultural, and technological change in graphic design. The program's foundation is broad-based. Students begin with courses in fundamental aspects of visual studies. Upper division courses prepare them for graphic design positions in print and electronic media. An internship of 1-2 credits is required.

Admission Requirements—Freshmen and transfer students are initially admitted as pre-graphic design majors.

After being admitted to CHE, pre-graphic design students must meet the following criteria to achieve full major status in the graphic design program.

- Complete DHA 1101W, 1311, 1312, and 1315.
- Maintain an overall GPA of at least 2.50.
- Receive positive assessment of design work through portfolio review.

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements, and maintain an overall GPA of at least 2.00. All required courses must be taken A-F, and all required DHA courses must be completed with a grade of at least a C-.

Required Courses

DHA 1101W—Introduction to Design Thinking (4 cr)
DHA 1311—Foundations: Drawing and Design in Two and Three Dimensions (4 cr)
DHA 1312—Foundations: Color Design in Two and Three Dimensions (4 cr)
DHA 1315—Foundations: The Graphic Studio (4 cr)
DHA 2311—Drawing and Illustration (3 cr)
DHA 2334—Computer Applications I: Digital Composition for Design (3 cr)
DHA 2345—Typographic Design (3 cr)
DHA 2351—Graphic Design I: Text and Image (3 cr)
DHA 2385W—Design and Factors of Human Perception (4 cr)
DHA 3312—Color and Form in Surface Design (3 cr)
DHA 3352—Graphic Design II: Identity and Symbols (3 cr)
DHA 3353—Graphic Design III: Packaging and Display (3 cr)
DHA 4131—History of Visual Communication (4 cr)
DHA 4196—Internship in DHA (1-2 cr)
DHA 4334—Computer Applications II: Design for the Digital Environment (3 cr)
DHA 4345—Advanced Typographic Design (4 cr)
DHA 4354—Graphic Design IV: Integrative Campaign (4 cr)
DHA 4355—Graphic Design Portfolio (2 cr)
DHA 4365W—Graphic Design Senior Seminar (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

One course from each of the following areas:

Art history, history, photography,
and business or economics or marketing

Materials Course

Select one from the following:

DHA 4330—Surface Fabric Design Workshop (4 cr)
DHA 4340—Woven, Knit, and Non-Woven Fiber Design Workshop (4 cr)
DHA 4351—Design Process: Photography (3 cr) (if not taken for the photography requirement)
DHA 4352—Design Process: Bookmaking (3 cr)
For additional approved courses, see your adviser.

Program Electives

Select two courses from the following:

DHA 4384—Interactive Media (3 cr)
DHA 5381—Digital Illustration (3 cr)
DHA 5382—Sound and Video (3 cr)
DHA 5383—Animation Design (3 cr)
DHA 5385—Internet-Based Media (3 cr)
For additional courses, see your adviser.

Sample Program

Freshman Year

Fall Semester

DHA 1101W—Introduction to Design Thinking (4 cr)*
DHA 1311—Foundations: Drawing and Design in Two and Three Dimensions (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Liberal education elective (4 cr)

Spring Semester

DHA 1312—Foundations: Color and Design in Two and Three Dimensions (4 cr)
DHA 1315—Foundations: The Graphic Studio (4 cr)
History course (3-4 cr)
Liberal education elective (4 cr)

CHE students find great jobs—A recent survey of graduates showed that almost 90% were working in a position related to their major.

Sophomore Year

Fall Semester

DHA 2311—Drawing and Illustration (3 cr)
DHA 2334—Computer Applications I: Digital Composition for Design (3 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Art history course (3 cr)
Liberal education elective (3)

Spring Semester

DHA 2345—Typographic Design (3 cr)
DHA 2385W—Design and Factors of Human Perception (4 cr)*
DHA 3312—Color and Form in Surface Design (3 cr)
DHA 4351—Design Process: Photography (3 cr)
Liberal education elective (3)

Junior Year

Fall Semester

DHA 2351—Graphic Design I: Text and Image (3 cr)
DHA 4131—History of Visual Communication (4 cr)*
DHA 4334—Computer Applications II: Design for the Digital Environment (3 cr)
Business/Marketing/Economics course (3 cr)
Liberal education elective (3)

Spring Semester

DHA 3352—Graphic Design II: Identity and Symbols (3 cr)
DHA 3353—Graphic Design III: Packaging and Display (3 cr)
DHA 4352—Design Process: Bookmaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
Liberal education elective (3 cr)

Senior Year

Fall Semester

DHA 4196—Internship (1-2 cr)
DHA 4345—Advanced Typographic Design (4 cr)
DHA 4354—Graphic Design IV: Integrative Campaign (4 cr)
Program elective (3 cr)
Liberal education elective (3 cr)

Spring Semester

DHA 4355—Graphic Design Portfolio (2 cr)
DHA 4365W—Senior Seminar (4 cr)*
Program elective (3 cr)
Liberal education elective (3 cr)

**Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Housing Studies

Department of Design, Housing, and Apparel

B.S.

The housing studies program allows students to study shelter in its multiple dimensions and to develop professional skills. Coursework in the program includes social and behavioral sciences, economics, public policy, planning, design, and technology.

After first acquiring a broad background of housing courses, students select one of four areas of concentration: community development and policy, housing technology, management and finance, or special populations.

The housing studies program provides the academic background and professional preparation needed for graduate studies leading to college teaching, research, or planning/administrative positions.

Depending upon prior courses a student has taken, the housing studies requirements can often be completed in approximately two years. Students are encouraged to meet with an adviser to discuss their specific situations.

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements, and maintain an overall GPA of at least 2.00. All required courses must be taken A-F and completed with a grade of at least C-.

Required Courses

DHA 1101W—Introduction to Design Thinking (4 cr)
DHA 2401—Introduction to Housing (3 cr)
DHA 2402—Residential Technology (3 cr)
DHA 2463—Housing and Community (3 cr)
DHA 4196—Internship in DHA (2 cr)
DHA 4461—Multifamily Housing Management (4 cr)
DHA 4465—Housing in Global Perspective (3 cr)
or DHA 5484—Rural Housing Issues (3 cr)
DHA 4482—Residential Environmental Quality (3 cr)
or DHA 5481—Housing for the Elderly and Special Populations (3 cr)
DHA 5463—Housing Policy (3 cr)
DHA 5467W—Housing and the Social Environment (3 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
WPS 4333—Systems Approach to Residential Construction (2 cr)
One finance course from ApEc 1101/Econ 1101, ApEc 1102/Econ 1102, Econ 3701, Econ 3801
One family course from FSoS 3101, FSoS 3102, FSoS 4106
One planning course from Geog 3361W, Geog 3371W, Geog 3605W, Geog 5372W, PA 4200
One statistics course from EPsy 3264, GC 1454, OMS 1550, Psy 4801, Stat 1001, Stat 3011

Areas of Concentration

All courses must be taken A-F and completed with a grade of at least C-. Each course may be used only once to satisfy program requirements.

Community Development and Policy Concentration

Courses in planning, geography, and political science prepare students to work with housing and redevelopment authorities, city or regional planning departments, and nonprofit organizations in policy making, planning, and housing development.

At least 20 credits from the following

ApEc 3311W, ApEc 5581, Arch 5645, DHA 4482, DHA 5481, DHA 5484, FSoS 4103, Geog 3361W, Geog 3371W, Geog 3373W, Geog 3605W, Geog 5361, Geog 5371W/PA 5201, Geog 5372W/ PA 5202, Geog 5724, PA 5002, PA 5004, PA 5013, PA 5212, Pol 1001, Rhet 4573, Rhet 5258, Soc 1001, Soc 3201, Soc 3211W, Soc 3451W, UrbS 1001W, UrbS 3001W, UrbS 3301W, UrbS 3751, UrbS 5101

Housing Technology Concentration

Courses in design, technology, architecture, and environmental studies prepare students to work in housing construction, renovation, and development firms; energy and housing inspection programs; and historic preservation organizations.

At least 20 credits from the following

Arch 3412, Arch 5671, Arch 5672, Arch 5673, ArtH 5546, CE 4101W, DHA 1601, DHA 1602, DHA 2612, DHA 2613, DHA 2621, DHA 4482, DHA 5481, Geog 5724, PubH 5110, PubH 5120, PubH 5171, PubH 5173, PubH 5200, Rhet 4573, WPS 3332, WPS 4335

Management and Finance Concentration

Courses in economics and business prepare students to work in public and private housing management, state finance agencies, commercial banks, and mortgage and title companies.

At least 20 credits from the following

ApEc 1101/Econ 1101, ApEc 1102/Econ 1102, ApEc 1251 or Acct 2050, ApEc 3001, ApEc 3002, ApEc 3006, ApEc 5341, ApEc 5581, Arch 5645, BLaw 3058, DHA 4482, DHA 5481, Econ 3701, Econ 3801, Fina 3001, Fina 4241, Geog 5361, Mgmt 3001, Mgmt 4002, Mktg 3001, Mktg 3010, Mktg 4040, Rhet 3266, Rhet 4165, Rhet 4573

Special Populations Concentration

Courses (or a minor) in areas such as sociology, social work, gerontology, women's studies, African-American and African studies, American Indian studies, or Chicano studies prepare students to work in housing-related programs involving human relations, advocacy, and affirmative action or to work in housing programs for low-income families and for the elderly or disabled.

An area of concentration in special populations may be fulfilled in two ways.

Option one—Complete an appropriate minor along with additional credits in supporting courses. Under option one, a concentration can be done in such minors as African-American and African studies, American Indian studies, Chicano studies, global studies, Latin American studies, women's studies, or youth studies. For admission procedures and minor requirements, contact the department offering the minor.

If option one is chosen, and the minor selected requires fewer than 20 credits, additional supporting coursework to total at least 20 credits must be completed. Supporting coursework could include one or more of the following subjects: social work, communication, anthropology, economics, education, geography, language, mathematics, political science, sociology, or statistics.

Option two—Concentrate on one or more special populations for which no specific undergraduate minor is offered. Under option two, a concentration can be based on 20 credits of coursework:

(a) Special Populations: the elderly: DHA 5481, DHA 5484, FSoS 4154W, Gero 5105, Kin 5385, PA 5412, Psy 5138, PubH 3001, PubH 5932, Rec 5241, Rhet 4573, Rhet 5258, SW 2001, SW 5313, WoSt 4201

(b) Special Populations: Low income, minority, and households with children: CPsy 2301, DHA 5484, FSoS 3101, FSoS 3102, FSoS 3103, FSoS 3426, FSoS 4102, FSoS 4153, FSoS 4156, Geog 3375, Geog 5371W, PA 3051, PA 3311, PA 5401, PA 5411, PA 5421, Pol 1001, Pol 3051, PubH 3001, PubH 3003, Rhet 4573, Rhet 5258, Soc 1001, Soc 3201, Soc 3211W, Soc 3251W, Soc 3451W, Soc 3501, SW 2001, SW 3051, SW 3101, SW 3203, SW 5101

Final Project

An internship of at least 300 hours in a situation related to the student's area of specialization is required. Students are required to complete at least half of the required core program courses before enrolling in the internship (DHA 4196).

Sample Program

Freshman Year

Fall Semester
DHA 1101W—Introduction to Design Thinking (4 cr)*
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Liberal education electives (7 cr)

Spring Semester
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Liberal education electives (12 cr)

Sophomore Year

Fall Semester
DHA 2401—Introduction to Housing (3 cr)
Finance course (3-4 cr)
Liberal education electives (9 cr)

Spring Semester
DHA 2402—Residential Technology (3 cr)
DHA 2463—Housing and Community Development (3 cr)*
Family course (3 cr)
Liberal education electives (6 cr)

Junior Year

Fall Semester
DHA 5481—Housing for the Elderly and Special Populations (3 cr)
or DHA 4482—Residential Environmental Quality (3 cr)
Concentration courses (6 cr)
Statistics course (3-4 cr)
Liberal education elective (3 cr)

Spring Semester
DHA 4461—Multifamily Housing Management (4 cr)
DHA 4465—Housing in Global Perspective (3 cr)*
or DHA 5484—Rural Housing Issues (3 cr)
WPS 4333—Systems Approach to Residential Construction (2 cr)
Concentration courses (6 cr)

Senior Year

Fall Semester
DHA 5467W—Housing and the Social Environment (3 cr)*
Rhet 3562W—Technical and Professional Writing (4 cr)
Planning course (3-4 cr)
Concentration courses (5-6 cr)

Spring Semester
DHA 4196—Internship (2 cr)
DHA 5463—Housing Policy (3 cr)
Concentration course (3 cr)
Liberal education electives (7 cr)

**Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Interior Design

Department of Design, Housing, and Apparel

B.S.

Interior design is a professional program accredited by the Foundation for Interior Design Education Research (FIDER). Its focus is on providing for human welfare by improving the quality of life and protecting human health and safety through design of the interior environment. Students study fundamentals, theory, process, communication, research, and technology to identify and solve problems related to humans and their use of interior space. They analyze human behavior to determine clients' functional, aesthetic, social, and psychological needs, which prepares them to solve interior design problems. They design various types of interiors such as hospitals, offices, schools, residences, restaurants, hotels, and entertainment facilities. To do this, students acquire

- a foundation in basic design,
- understanding of the relationship between individuals and their environments,
- understanding of the contextual relationship of the site, the building, and its systems to the interior,
- knowledge of regulations that govern their practice of interior design,
- the ability to research users' needs and apply their findings to problem identification and solution,
- understanding of historical precedent and contemporary design theories,
- technical knowledge and communication skills,
- understanding of business issues and professional ethics, and
- a sense of responsibility to society, especially in the use of resources.

Admission Requirements—Freshmen and transfer students are initially admitted into the program as pre-interior design majors.

The interior design program is the only four-year accredited interior design program in Minnesota.

After being admitted to CHE, pre-interior design students must meet the following criteria to achieve full major status in the interior design program.

- Complete freshman composition and at least one additional liberal education course.
- Complete DHA 1101W, 1311, 1312, 1601, and 1602.
- Maintain overall GPA of at least 2.50.
- Receive positive assessment of design work through portfolio review.

Degree Requirements

To complete the degree, students must complete at least 125 credits, including the University's liberal education requirements, and maintain an overall GPA of at least 2.00. All required courses must be taken A-F and completed with a grade of at least C-. Finally, students must complete a 400-hour internship after completing DHA 3606.

Required Courses

Arch 3411—Architectural History to 1750 (3 cr)
or Arch 3412—Architectural History Since 1750 (3 cr)
DHA 1101W—Introduction to Design Thinking (4 cr)
DHA 1311—Foundations: Drawing and Design in Two and Three Dimensions (4 cr)
DHA 1312—Foundations: Color and Design in Two and Three Dimensions (4 cr)
DHA 1601—Interior Design Studio I (4 cr)
DHA 1602—Interior Design Studio II (4 cr)
DHA 2213—Textile Analysis (4 cr)
DHA 2402—Residential Technology (3 cr)
DHA 2603—Interior Design Studio III (4 cr)
DHA 2604—Interior Design Studio IV (4 cr)
DHA 2612—Interior Materials and Life Safety (4 cr)
DHA 2613—Lighting Design and Building Systems (4 cr)
DHA 2621—Computer Aided Design: Interior Design (4 cr)
DHA 3605—Interior Design Studio V (4 cr)
DHA 3606—Interior Design Studio VI (4 cr)
DHA 3614—Interior Design Ethics and Professional Practice (4 cr)
DHA 4161—History of Interiors and Furnishings: Ancient to 1750 (4 cr)
DHA 4162—History of Interiors and Furnishings: 1750 to Present (4 cr)
DHA 4196—Internship in DHA (1 cr, additional credit optional)
DHA 4607—Interior Design Studio VII (4 cr)
DHA 4608W—Interior Design Thesis (6 cr)
Econ 1101/ApEc 1101—Principles of Microeconomics (3-4 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Mktg 3001—Principles of Marketing (3 cr)
Psy 1001—Introduction to Psychology (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Recommended courses if elective credit is needed to total 125 credits required for graduation:
DHA 5111—History of Decorative Arts (4 cr)
DHA 5481—Housing for the Elderly and Special Populations (3 cr)
DHA 4131—History of Visual Communication (4 cr)
DHA 4330—Surface Fabric Design Workshop (4 cr)
or DHA 4340—Woven, Knit, and Non-Woven Fiber Design Workshop (4 cr)

Sample Program

Freshman Year

Fall Semester
DHA 1101W—Introduction to Design Thinking (4 cr)*
DHA 1311—Foundations: Drawing and Design in Two and Three Dimensions (4 cr)
DHA 1601—Interior Design Studio I (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)

Spring Semester
DHA 1312—Foundations: Color and Design in Two and Three Dimensions (4 cr)
DHA 1602—Interior Design Studio II (4 cr)
DHA 2402—Residential Technology (3 cr)
Psy 1001—Introduction to Psychology (4 cr)*

Sophomore Year

Fall Semester
DHA 2213—Textile Analysis (4 cr)
DHA 2603—Interior Design Studio III (4 cr)
DHA 2612—Interior Materials and Life Safety (4 cr)
DHA 2621—Computer Aided Design: Interior Design (4 cr)

Spring Semester
DHA 2604—Interior Design Studio IV (4 cr)
DHA 2613—Lighting Design and Building Systems (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Liberal education elective (3-4)

Junior Year

Fall Semester
DHA 3605—Interior Design Studio V (4 cr)
DHA 3614—Interior Design Ethics and Professional Practice (4 cr)*
Econ 1101—Principles of Microeconomics (4 cr)*
Liberal education elective (3-4)

Spring Semester
Arch 3411—Architectural History to 1750 (3 cr)*
or Arch 3412—Architectural History Since 1750 (3 cr)*
DHA 3606—Interior Design Studio VI (4 cr)
DHA 4196—Internship (1 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
Liberal education elective (3-4)

Senior Year

Fall Semester
DHA 4161—History of Interiors and Furnishings: Ancient to 1750 (4 cr)*
DHA 4607—Interior Design Studio VII (4 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Liberal education elective (6-8 cr)

Spring Semester
DHA 4162—History of Interiors and Furnishings: 1750 to Present (4 cr)*
DHA 4608W—Interior Design Thesis (6 cr)
Mktg 3001—Principles of Marketing (3 cr)
Liberal education electives (4-6 cr)

**Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Nutrition

B.S.

The nutrition program is a collaborative partnership between CHE and the College of Agricultural, Food and Environmental Sciences. The major explores how nutrients and the foods from which they are derived aid the body in health, growth, and development. With major national and international concern for how food and nutrition affect health and disease, registered dietitians and nutritionists have many career opportunities. Students choose one of three options: nutrition, the Coordinated Program in Dietetics, or nutrition science.

Students expecting to apply to either the Coordinated Program in Dietetics, an internship, or a graduate school should maintain a GPA of at least 2.80. A cumulative GPA of at least 3.00 is highly recommended, and in the case of some graduate schools is required, for admission.

The Didactic Program in Dietetics (nutrition option) is currently granted approval status, and the Coordinated Program in Dietetics is currently granted accreditation status, by the Commission on Accreditation/Approval for Dietetics Education of the American Dietetic Association, 216 W. Jackson Blvd., Chicago, IL 60606-6995 (312-899-4876).

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements, and must maintain an overall GPA of at least 2.00. All required courses must be taken A-F, and FScN courses must be completed with a grade of at least C-.

Required Courses for All Options

BioC 3021—Biochemistry (3 cr)
Biol 1009—General Biology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2301—Organic Chemistry I (3 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)
FScN 1112—Principles of Nutrition (3 cr)
FScN 3102—Introduction to Food Science (3 cr)
FScN 3612—Life Cycle Nutrition (3 cr)
FScN 4612—Human Nutrition (3 cr)
FScN 4613—Experimental Nutrition (2 cr)
FScN 5621—Nutrition and Metabolism (4 cr)
Phsl 3051—Human Physiology (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
VPB 2032—General Microbiology with Laboratory (4 cr)
or MicB 2032—General Microbiology with Laboratory (4 cr)
or MicB 3301—Biology of Microorganisms (5 cr)

Nutrition

The nutrition option (also referred to as the Didactic Program in Dietetics) offers preparation in the basic sciences and liberal education, a background in food science, and a focus on human needs related to nutrition. Students identify several areas of interest and develop a varied portfolio of competence. Work experience in nutrition, elective courses, and extracurricular activities develop communication and leadership skills. Graduates of the program take positions in various food-related fields, including nutrition, industry, and community programs. Students who plan to become registered dietitians must meet the American Dietetic Association requirements. Graduates who have a cumulative GPA of 3.00, strong work experience in nutrition, demonstrated leadership skills, and who are highly recommended, may apply for a postbaccalaureate dietetic internship.

Additional Courses

FScN 3614—Nutrition Education (3 cr)
FScN 3615—Sociocultural Aspects of Food, Nutrition, and Health (3 cr)
FScN 3731—Food Service Operations Management Lab (2 cr)
FScN 3732—Food Service Operations Management (3 cr)
FScN 4614—Community Nutrition (3 cr)
FScN 4665—Medical Nutrition Therapy I (3 cr)
FScN 4666—Medical Nutrition Therapy II (3 cr)
FScN 4732—Food and Nutrition Management (3 cr)
Math 1031—College Algebra and Probability (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)

Choose one of the following:
FScN 4111—Food Chemistry (3 cr)
FScN 4121—Food Microbiology and Fermentations (3 cr)

Coordinated Program in Dietetics

Students can apply, before their junior year, to the University's Coordinated Program in Dietetics and complete both the academic and professional experience requirements within two years.

The basic curriculum is similar to that specified under Required Courses for All Options, but also includes field experience courses in which didactic and clinical phases of instruction are coordinated. A detailed plan of the program may be obtained from the Department of Food Science and Nutrition. A limited number of students are admitted to the program each year. Minnesota law requires each student admitted to a supervised practice in dietetics to have a criminal background check conducted by the state of Minnesota. The dietetic program director arranges for the background check. Failure to pass the background check results in dismissal from the program.

Additional Courses

(Nutrition Option plus field experiences)
FScN 3614—Nutrition Education (3 cr)
FScN 3615—Sociocultural Aspects of Food, Nutrition, and Health (3 cr)
FScN 3662—Introduction to Dietetic Practice (2 cr)
FScN 3732—Food Service Operations Management (3 cr)
FScN 3796—Field Experience in Food Service Management (3 cr)
FScN 4596—Field Experience: Community Nutrition (3 cr)
FScN 4614—Community Nutrition (3 cr)
FScN 4665—Medical Nutrition Therapy I (3 cr)
FScN 4666—Medical Nutrition Therapy II (3 cr)
FScN 4696—Field Experience: Medical Nutrition Therapy I (6 cr)
FScN 4732—Food and Nutrition Management (3 cr)
FScN 4796—Field Experience in Food and Nutrition Management (3 cr)
FScN 4896—Field Experience: Medical Nutrition Therapy II (3 cr)
FScN 4996—Field Experience: Medical Nutrition Therapy III (3 cr)
Math 1031—College Algebra and Probability (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)

Choose one of the following:
FScN 4111—Food Chemistry (3 cr)
FScN 4121—Food Microbiology and Fermentations (3 cr)

Nutrition Science

The nutrition science option is for students planning to do graduate work in nutrition, related sciences, or professional programs such as medicine or dentistry.

Additional Courses

Biol 2012—General Zoology (4 cr) or another advanced biology course
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Chemistry Lab (4 cr)
FScN 4111—Food Chemistry (3 cr) or an advanced chemistry course

Through the generosity of alumni and friends, the college has one of the largest endowments for undergraduate scholarships at the University, ranging between $1,000 and $5,000.

FScN 5622—Vitamin and Mineral Biochemistry (3 cr)
FScN 5623—Regulation of Energy Balance (2 cr)
GCB 3022—Genetics (3 cr)
or Biol 4003—Genetics (3 cr)
Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
Phys 1201—General Physics I (5 cr)
Phys 1202—General Physics II (5 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 3021—Introduction to Probability and Statistics (3 cr)
or Stat 5021—Statistical Analysis (4 cr)

Nutrition Minor

For those having completed Biol 1009, Chem 1022, and Phsl 3051:

FScN 1112—Principles of Nutrition (3 cr)
FScN 3612—Life Cycle Nutrition (3 cr)
FScN 4612—Human Nutrition (3 cr)
Select two courses from the following: FScN 3614, 3615, 4613, 4614, and 5621

Sample Program—Nutrition Option

Freshman Year

Fall Semester
Biol 1009—General Biology (4 cr)*
Chem 1021—Chemical Principles I (4 cr)*
FScN 1112—Principles of Nutrition (3 cr)*
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Spring Semester
Chem 1022—Chemical Principles II (4 cr)
FScN 1102—Food: Safety, Risks, and Technology (3 cr)*
Math 1031—College Algebra and Probability (3 cr)*
Rhet 1223—Oral Presentations in Professional Settings (3 cr)

Sophomore Year

Fall Semester
Chem 2301—Organic Chemistry I (3 cr)
FScN 3612—Life Cycle Nutrition (3 cr)
Phsl 3051—Human Physiology (4 cr)
Liberal education elective (6 cr)
Spring Semester
BioC 3021—Biochemistry (3 cr)
FScN 3615—Sociocultural Aspects of Food, Nutrition, and Health (3 cr)*
Stat 3011—Introduction to Statistical Analysis (4 cr)*
Liberal education electives (6 cr)

Junior Year

Fall Semester
FScN 3102—Introduction to Food Science (3 cr)
FScN 3614—Nutrition Education (3 cr)
FScN 3731—Food Service Operations Management Laboratory (2 cr)
FScN 3732—Food Service Operations Management (3 cr)
FScN 4612—Human Nutrition (3 cr)
Liberal education elective (3 cr)
Spring Semester
FScN 4614—Community Nutrition (3 cr)*
Mgmt 3001—Fundamentals of Management (2 cr)
MicB 2032—General Microbiology with Laboratory (MicB 3301 or VPB 2032 are also acceptable) (4-5 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)*
Liberal education elective (3 cr)

Senior Year

Fall Semester
FScN 4111—Food Chemistry (3 cr)
FScN 4665—Medical Nutrition Therapy I (3 cr)
FScN 5621W—Nutrition and Metabolism (4 cr)*
Liberal education elective (6 cr)
Spring Semester
FScN 4613—Experimental Nutrition (2 cr)
FScN 4666—Medical Nutrition Therapy II (3 cr)
FScN 4732—Food and Nutrition Management (3 cr)*
Liberal education electives (6 cr)

**Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Retail Merchandising

Department of Design, Housing, and Apparel

B.S.

The retail merchandising program offers a wide range of educational and career opportunities, including visits to international retailers, travel to foreign and domestic retail centers, and professional experiences such as study abroad and internships with national and international retailers. Graduates of the program begin their careers in store or corporate environments. Entry-level positions include merchandising, marketing, product development, distribution, store management, buying, advertising, sales promotion, and human resources.

Degree Requirements

Students must complete at least 120 credits, including the University's liberal education requirements, and must maintain an overall GPA of at least 2.00. All required courses must be taken A-F and completed with a grade of at least C-.

Required Courses

Acct 2050—Introduction to Financial Reporting (4 cr)
or ApEc 1251—Principles of Accounting (3 cr)
ApEc/Econ 1101—Principles of Microeconomics (3-4 cr)
ApEc/Econ 1102—Principles of Macroeconomics (3-4 cr)
BIE 5626—Customer Service Training (3 cr)
or BIE 5624—Sales Training (3 cr)
DHA 1101W—Introduction to Design Thinking (4 cr)
DHA 1201—Clothing Design, Merchandising, and the Consumer (3 cr)
DHA 2213—Textile Analysis (4 cr)
DHA 2214—Softlines Analysis (3 cr)
DHA 3245—Nonstore Retailing (3 cr)
DHA 4196—Internship in DHA (3 cr)
DHA 4212W—Dress, Society, and Culture (3 cr)
DHA 4215—Product Development: Softlines (4 cr)
DHA 4217—International Developments in Textiles and Apparel (4 cr)
DHA 4241—Retail Promotion (3 cr)
DHA 4242—Retail Buying (3 cr)
HE 3201—Strategic Career Planning (1 cr)
HRIR 3021—Human Resource Management and Industrial Relations (3 cr)
Math 1031—College Algebra and Probability (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Mgmt 4002—Managerial Psychology (4 cr)
Mktg 3001—Principles of Marketing (3 cr)
Mktg 3010—Marketing Research (4 cr)
Mktg 4040—Buyer Behavior (4 cr)
OMS 1550—Business Statistics: Data Sources, Presentation, and Analysis (4 cr)
Psy 1001—Introduction to Psychology (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)

Advanced core electives
Select two additional courses from the following:
DHA 3217, 3243, 4121, 5216

Final Project

A three-credit internship is to be completed before the last semester of the student's program.

Sample Program

Freshman Year

Fall Semester

DHA 1101W—Introduction to Design Thinking (4 cr)*
DHA 1201—Clothing Design, Merchandising, and the Consumer (3 cr)*
Econ 1101—Principles of Microeconomics (4 cr)*
or ApEc 1101—Principles of Microeconomics (3 cr)*
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)

Spring Semester

Econ 1102—Principles of Macroeconomics (4 cr)*
or ApEc 1102—Principles of Macroeconomics (3 cr)*
Math 1031—College Algebra and Probability (3)*
Psy 1001—Introduction to Psychology (4 cr)*
Rhet 1223—Oral Presentations in Professional Settings (3 cr)

Sophomore Year

Fall Semester

Acct 2050—Introduction to Financial Reporting (4 cr)
or ApEc 1251—Principles of Accounting (3 cr)
DHA 2213—Textile Analysis (4 cr)
Liberal education electives (7-8 cr)

Spring Semester

HRIR 3021—Human Resources Management and Industrial Relations (3 cr)
DHA 2214—Softlines Analysis (3 cr)
DHA 3245—Nonstore Retailing (3 cr)
OMS 1550—Business Statistics: Data Sources, Presentation, and Analysis (4 cr)
Liberal education elective (2-3 cr)

Junior Year

Fall Semester

HE 3201—Strategic Career Planning (1 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Mktg 3001—Principles of Marketing (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
Advanced core elective (3-4 cr)

Spring Semester

DHA 4212W—Dress, Society, and Culture (3 cr)*
Mgmt 4002—Managerial Psychology (4 cr)
Mktg 4040—Buyer Behavior (4 cr)
Liberal education elective (3 cr)

Senior Year

Fall Semester

BIE 5626—Customer Service Training (3 cr)
or BIE 5624—Sales Training (3 cr)
DHA 4196—Internship (3 cr)
DHA 4241—Retail Promotion (3 cr)
Advanced core elective (3-4 cr)
Liberal education elective (2-3 cr)

Spring Semester

DHA 4215—Product Development: Softlines (4 cr)
DHA 4217—International Developments in Textiles and Apparel (4 cr)*
DHA 4242—Retail Buying (3 cr)
Mktg 3010—Marketing Research (4 cr)

**Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Youth Studies

School of Social Work

Minor Only

The youth studies minor is a 16-credit undergraduate minor that addresses youth as an idea, youth as young people, youthhood as the everyday lives of young people, and the responses of communities to this population.

Participants in the youth studies minor will learn about and critically analyze at a beginning level the families of ideas, models, concepts, discourses, and ways of understanding, responding to, and working with young people. Participants will craft their unique program from among the required designated courses to prepare for graduate training/education in the many scholarly and youth work professional fields. Participants will not become trained workers with youth nor receive any certification to do youth work in any participating field.

Required Courses

YoSt 2002—Introduction to Youth Studies: Understanding Youth, Young People, Youthhood, and Youth Work (4 cr)
YoSt 4002—Constructing Personal Models of Youth Scholarship and Youth Work (4 cr)
Eight additional credits from 15 different elective courses.

For more information contact Youth Studies, School of Social Work, 170 Peters Hall, St. Paul Campus, at 612-624-3700, or look for this minor on the Web site <www.ssw.che.umn.edu> under Centers and Projects.

This is the College of Liberal Arts section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

College of Liberal Arts

Degree Programs and Minors

College of Liberal Arts

General Information

At the heart of every great university is a college encompassing the basic disciplines of knowledge. That college at the University of Minnesota is the College of Liberal Arts (CLA). The college was formally established in 1868, 17 years after the founding of the University. CLA's mission is to encourage habits of creative and critical thinking, develop analytical skills, and enable undergraduates to study with researchers at the forefront of defining their fields of study. A liberal arts education provides an excellent foundation for graduates entering the ever-changing world of work.

The social sciences, humanities, and fine arts are housed in CLA. Study and research opportunities are available in more than 60 major areas. In addition to strong programs in disciplines, CLA offers interdisciplinary majors such as women's studies, film studies, and urban studies that draw on the strengths of disciplines and integrate them in new and exciting ways. CLA also offers B.A. degrees in some science programs housed in the Institute of Technology and the College of Biological Sciences. (See the list of majors on page 152 for details.) The B.A. degree may be particularly appropriate for science students who wish to become high school teachers, who would like to pursue careers in scientific writing, or who wish to preserve more flexibility in their programs than the B.S. degree allows.

About 15,000 undergraduate students and about 1,600 graduate students were enrolled in CLA programs in fall 2001. The college is staffed by over 500 permanent faculty whose teaching is informed by the most current research in their fields.

As the port of entry to the University for many students, CLA prides itself on its Student Communities, which offer academic advising and other services. Student Services staff help direct students to the many learning opportunities available within CLA and throughout the University and the Twin Cities.

The degree requirements established by the college give students an education solidly based in the liberal arts. Courses that meet the Twin Cities campus-wide liberal education requirements will introduce students to modes of inquiry and subject matter characteristic of the major branches of knowledge, as well as four themes of particular contemporary relevance: international perspectives, cultural diversity, environmental issues, and citizenship and public ethics. In recognition of the importance of communication and the ability to write, students take several writing courses, including a formal first-year composition or rhetoric course and upper level intensive writing courses. The CLA language requirement helps students become proficient in a second language.

A liberal education means not only a breadth of knowledge, but depth and proficiency in a single field of knowledge. Students select a major field and, as part of the study of that discipline, prepare a major project, usually a paper.

Admission

Prospective Student Services

Prospective CLA students can find information about student life and academic programs at <www.cla.umn.edu>.

Preadmission advising and assistance are offered by the University's Office of Admissions. If students would like to visit the campus and talk about plans for study in CLA, they should contact the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2008) <http://admissions.tc.umn.edu>.

Enrollment Limits—The University of Minnesota has approved enrollment limits for the Twin Cities campus. To remain within those limits, CLA must limit the number of new students it admits. If the college exceeds its enrollment limit, there will be inadequate funding to meet the educational needs of its students. The college will admit as many qualified students as possible without exceeding its projected enrollment limit.

Application Procedures

Freshman Admission

Freshman applicants are high school graduates or high school seniors who will graduate before they enroll in CLA. These students are freshmen regardless of any college credits they may have completed while in high school such as postsecondary enrollment options credits. High school graduates who have enrolled in a post-secondary institution after graduation are considered transfer applicants for admission purposes, regardless of the number of credits completed.

For official and up-to-date information about the University's admissions policies, procedures, and deadlines, please see the latest edition of the *Undergraduate Application Booklet* available from the Office of Admissions or online at <http://admissions.tc.umn.edu>.

In fall 2001, 64 percent of CLA freshmen ranked in the top quarter of their class. The mean high school rank was 80 percent. The mean ACT composite score was 25. The mean SAT verbal score was 599 and mean SAT math score was 600. Applicants are not guaranteed admission even if they match or exceed some or all of these score levels.

Transfer Admission

Students who have completed at least 26 (39 quarter) credits of transferable college coursework will be considered for admission based on college academic record. High school graduates who have completed less than a full year of college coursework at the time of admission will be considered for admission using a combination of transfer and freshman admission criteria. The key factors considered are cumulative grade point average, course completion patterns, grade trends in the most recent 24 credits, and residency status. See Transfer Admission in the General Information section of this catalog.

Students must indicate a CLA major on the admission application to be considered for admission to CLA. Pre-professional plans are not CLA majors. Students with 60 semester (90 quarter) credits or more must declare a major on their admission application. Some majors have additional requirements for admission to the major. See additional admission requirements under individual majors in this catalog. Students are admitted in spring semester only if space is available.

Honors Program Admission

For admission to the honors program, students must be admitted to CLA through the regular application procedure described for new freshmen or new transfer students. Students applying for freshman admission must use the *University of Minnesota Scholarships and Honors Programs Application.* Admitted students typically rank in the top ten percent of their high school class with an ACT composite score of 28 or higher or an SAT combined score of 1260 or higher. Transfer students may apply with grade point averages of 3.50 or higher. Students may be admitted to the honors program after they enroll in the college provided they have at least three semesters remaining before graduation (ordinarily before 75 credits are completed.) For information about program eligibility and application procedures, contact the CLA Honors Division, 115 Johnston Hall, 101 Pleasant Street S.E., University of Minnesota, Minneapolis, MN 55455 (612-624-5522) or see <http://cla.umn.edu/honors/>.

Martin Luther King Program Admission

For admission to the Martin Luther King (MLK) Program, students must be admitted to CLA through the regular application procedure described for new freshmen or new transfer students. Students should indicate interest in the MLK Program on their application. For currently enrolled or returning students, information regarding the MLK Program may be obtained in 19 Johnston Hall (612-625-2300) <www.mlk.umn.edu>.

Non-degree Seeking/Postbaccalaureate Admission

Students interested in enrolling in CLA courses but not in earning a CLA degree may wish to consider enrollment opportunities available through the College of Continuing Education, 101 Wesbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-3333).

Advising services for CLA non-degree seeking students are available from the student communities. Please consult the Student Services Web site <www.cla.umn.edu/class/q1.php> or call 612-625-3846 for more information. Advisers aid in planning programs to suit students' outside demands and in selecting coursework to take fullest advantage of the college's resources.

Orientation

New students must participate in a CLA orientation program before their first semester of enrollment. College faculty and staff, together with staff from the University's New Student Programs Office, introduce students to resources and services of the University and college. College advisers meet with students in groups and individually to explain degree requirements, answer questions, and work out initial registration for courses. Students also receive help using electronic self-registration. Orientations are scheduled up to three months before the start of the semester for which students are admitted.

New students receive their scheduled orientation date by mail, along with a variety of planning resources. Before students come to campus, they should use this information to identify various majors of interest, clarify their goals for the first semester, and consider which on-campus activities they may want to be involved in. When students come to campus they receive a *CLA New Student Handbook* or, if they are transfer students with a declared major, a *CLA Graduation Handbook.* Both handbooks contain details about registration, course selection, transfer of credits, and college services; these handbooks are to be used in conjunction with this catalog. Students who have questions about college procedures between the time they are admitted and when they enroll should contact the CLA Student Information Office, 49 Johnston Hall (612-625-2020).

Degrees/Majors

CLA offers five bachelor's degrees—bachelor of arts (B.A.), bachelor of fine arts (B.F.A.), bachelor of science (B.S.), bachelor of individualized studies (B.I.S.), and bachelor of music (B.M.).

If students are making satisfactory academic progress, they generally are free to select the major and minor of their choice. Some programs, however, limit the number of majors admitted. See the program descriptions below for more information.

Bachelor of Arts Degree—This degree can be earned through majors in most CLA departments and programs. Its breadth and diversity in general education make it valuable as a base for many kinds of careers or advanced study. CLA offers several professional majors and specializations as well as interdepartmental programs for the B.A.

Bachelor of Fine Arts Degree—The Department of Art and the Department of Theatre Arts and Dance offer the B.F.A. for students who demonstrate superior professional promise. Information about program admission and degree requirements can be obtained from the appropriate department office.

Bachelor of Science Degree—The B.S. degree is offered in five areas: child psychology, economics, geography, sociology, and urban studies. The B.S. provides a more specialized concentration than the B.A.

Bachelor of Individualized Studies Degree—To earn this degree, students propose an individualized program of study composed of three areas of concentration based on their personal academic objectives. Proposals must be evaluated and approved by three faculty advisers.

Bachelor of Music Degree—The School of Music offers the B.M. degree for students who demonstrate superior professional promise in performance, music education, and music therapy.

The median high school rank for new CLA honors students is in the 96th percentile.

CLA Degrees Earned Concurrently With Other University of Minnesota Degrees—If students transfer to another college on the Twin Cities campus, they may complete their CLA degree by finishing all CLA degree requirements while pursuing degree work in their new college. Students should contact their college office for more information.

Second Degrees, Second Majors, Minors—If students have earned a bachelor's degree at another institution, they may earn a CLA bachelor's degree with a different major by completing all degree requirements, including 30 CLA semester credits. If students are CLA graduates or in the process of earning a CLA degree, they may earn a different CLA bachelor's degree by completing 30 additional CLA credits and meeting all requirements for the second degree. If students are CLA graduates and interested in completing requirements for a second major, but not for a second bachelor's degree in the college, they may complete requirements for another major and have that accomplishment recorded on their official transcript. In addition, students in other colleges may earn majors or minors in CLA.

CLA Majors

Major Sequences—Candidates for all CLA degrees except the B.I.S. must complete a major to gain depth of understanding in an area of study. More than 60 majors are offered in the college. Requirements change from time to time. Check with the undergraduate studies office in the major department for current information.

CLA offers major and minor programs in the following subjects.

African American and African studies
American Indian studies
American studies
Ancient Near Eastern studies (major only)
Anthropology
Architecture
Art
Art history
Asian languages and literatures
Astronomy
Biology, society, and environment
Chemistry
Chicano studies
Child psychology
Classical and Near Eastern archaeology
Classical civilization
Communication studies
Computer science
Cultural studies and comparative literature
Dance
Economics
English
French studies
French and Italian studies (major only)
Geography
Geology
German studies
Global studies
Greek
Hebrew
History
Individualized studies (major only)
Interdepartmental major (major only)
Italian studies
Jewish studies
Journalism and mass communication
Latin
Linguistics
Mathematics
Microbiology (major only)
Music
Music education (major only)
Music performance (major only)
Music therapy (major only)
Philosophy
Physics
Physiology (major only)
Political science
Psychology
Religious studies
Russian
Scandinavian languages and Finnish
Sociology
Spanish studies
Spanish-Portuguese studies
Speech and hearing science
Statistics
Studies in cinema and media culture
Theatre arts
Urban studies
Women's studies

Students may prepare in CLA for the following professional programs (preparation for these involves one to four years of study in CLA).

Architecture
Dental hygiene
Dentistry
Education
Law
Management
Medical technology
Medicine
Mortuary science
Nursing
Occupational therapy
Pharmacy
Physical therapy
Public affairs
Public health
Recreation, park, and leisure studies
Veterinary studies

CLA offers additional minor programs in the following subjects.

Biblical studies
Dutch studies
East Asian studies
Environmental geosciences
European area studies
Foreign studies
History of medicine
History of science and technology
Humanities in the West
Latin American studies
Medieval studies
New Media studies
Russian area studies
South Asian and Middle Eastern area studies

Major Requirements

Major Status—Majors are programs of concentration. Each represents the judgment of its department about appropriate study of the discipline at the undergraduate level. The department or students' major adviser may modify individual major programs. Admission to major status in some CLA degree programs requires department permission. See below and Degree Programs for more information on specific degree programs.

Required Preparatory Courses—Most major programs require preparatory or background courses that qualify students to enter advanced major work. Many of these courses satisfy general education requirements. See individual program listings for required preparatory courses.

Major Project—CLA requires that students complete a major project. The project demonstrates analytic and conceptual skills as well as an understanding of the mode of inquiry characteristic of the discipline. For most majors, the format of the project is a paper.

Outside-of-Major Requirement—B.A. programs must include at least 18 3xxx, 4xxx, and 5xxx credits outside the major department. Heavy concentration in a major field that limits breadth of learning may defeat the basic purpose of a liberal education, which encompasses breadth as well as depth of knowledge. Established and individualized interdepartmental majors listed below are exempt from this requirement.

Established Interdepartmental Majors—These majors are offered in African American and African studies, American studies, studies in cinema and media culture, classical civilization, cultural studies and comparative literature, individually designed interdepartmental major, global studies, Jewish studies, Latin American studies, and urban studies. Requirements are detailed under the major offerings. These majors may be modified in individual cases. Such majors do not require 18 3xxx, 4xxx, and 5xxx credits outside the major department.

Individually Designed Interdepartmental Major (IDIM)—The IDIM allows students to design a unique program with an interdisciplinary theme or focus tailored to their individual academic interests. It requires approval by the Individualized Programs Office, 345 Fraser Hall, and three faculty advisers. The major combines coursework from three or more CLA departments. A senior project is required to integrate the areas of concentration.

Bachelor of Individualized Studies—If students seek an even broader program of study than the IDIM, they may wish to consider the B.I.S. degree. For this degree, students design an individualized program made up of three concentrations totaling 50 credits. The program must be evaluated and approved by three faculty advisers. The program must have coherence based on stated academic objectives. This program has much in common with the IDIM—student initiative in proposing courses, close contact with faculty advisers, highly individualized programs. It differs from the IDIM in permitting multiple educational objectives rather than a single theme or concentration, and in allowing one concentration outside the college, provided it is relevant to students' objectives and approved by their advisers. The Bachelor of Individualized Studies Office is in 345 Fraser Hall (612-624-8006). For more information, see the Degree Programs section starting on page 158 of this catalog.

Double Major—Students may earn a second major in CLA. Students interested in pursuing a double major should consult with a CLA advising office to learn what steps are necessary for their areas of interest. Students may also combine a CLA major with a major or minor from another college in the University.

Minor

A minor is an approved concentration of 14 or more 2xxx, 3xxx, 4xxx, and 5xxx courses. It is not a requirement for graduation, but is an option for all students at the University. CLA students may choose a minor from another college at the University; likewise, all CLA minors are open to students in other colleges.

One-third of CLA's programs rank in the top 20 in the nation.

Honors Division

115 Johnston Hall (612-624-5522)

The CLA honors division offers freshman/sophomore and junior/senior honors programs to intellectually promising and highly motivated students. Its purpose is to broaden the scope of student learning, encourage full use of student potential, and recognize student accomplishments. Among its offerings are honors courses, small discussion groups for freshmen and sophomores, seminars for juniors and seniors, special advisers, departmental honors plans, and opportunities for advanced research and individual study.

Graduation With Honors—Enrollment in the honors program is required for graduation with the traditional honors designations *cum laude, magna cum laude,* and *summa cum laude.* Other graduation criteria include University of Minnesota residence, a grade point average (GPA) of at least 3.50, participation in four honors opportunities, in some instances fulfillment of requirements designated for the major field, and an honors thesis or project.

Honors Courses—Honors courses or special honors sections of regular courses are often small in size and taught by selected teachers. Although grading standards are comparable to those of other courses, topics and materials are approached in greater depth. These courses are designated by an "H" or a "V" after the course number.

Honors Colloquia—These seminar-size discussion groups are led by faculty or advanced graduate students. They are open to all honors freshmen and sophomores. Topics change each semester and vigorous student participation is the norm. Field trips and other special learning methods often characterize the colloquia. They carry credit, but because new topics and hours are selected each semester, they are not listed in this catalog. A list of topics is available in the Honors Program Office.

Honors Seminars—These seminars are open to honors program students who have completed 60 credits (other applicants are sometimes admitted when class space permits). In contrast to departmental honors course offerings, which emphasize depth of learning within fields, honors seminars serve the interests of students of high ability but with little background in the subject field. The seminars cover a wide range of topics, often of an interdisciplinary character, and deal with problems and ideas not treated in the regular curricular offerings of the college. Topics are specified in the *Class Schedule* and descriptions are available in the Honors Program Office.

Freshman-Sophomore Honors Program—Honors students who have earned fewer than 60 credits may participate in a program that provides certain educational opportunities: special faculty advisers, special library loan privileges, and assistance by the Honors Program staff in making a variety of premajor decisions. There are honors opportunities both for students who will seek a CLA degree and for preprofessional students who will complete their degrees outside of CLA. Freshmen and

The University's Weisman Art Museum is a stainless-steel spectacle that overlooks the Mississippi River and includes "five of the most gorgeous galleries on earth," according to *The New York Times.*

sophomores are strongly encouraged to complete at least two honors courses per year. Students who complete three honors opportunities and earn a 3.50 GPA in their freshman and sophomore years receive a certificate and a notation on their transcript.

Junior-Senior Honors Program—If students have completed 60 credits and declared their major, they may participate in the honors curriculum in their major field as well as in a variety of academic opportunities, including honors seminars. Students are assisted in scholarship and fellowship matters, especially in preparation for graduate work, and have access to experienced counsel about graduate and professional study. When undertaking a research project, they have special library privileges. Grants are available to help them meet project costs.

Continuation in Honors—The academic progress of honors students is reviewed annually. Students whose grades fall below the level necessary to graduate with honors may be denied continuation in the program.

Departmental Honors Curricula—Most CLA departments provide special honors opportunities for which students must meet special requirements. Information about these offerings as well as about graduation with honors may be obtained from department or program offices or from the Honors Program Office.

Honors Program Office—College records for honors students are kept in 115 Johnston Hall. The office also provides academic advising, procedural information, and other college office services to honors students.

Policies

Scholastic Standing—The Student Scholastic Standing Committee, comprised of administrators and college office staff, interprets and enforces college and University regulations relating to academic affairs. It handles requests for exceptions to registration policies and procedures, transfer of credit policies, and some degree requirements. The committee administers the college's probation system, monitoring students' performance and dealing with questions of probation, suspension, and readmission.

The committee seeks to maintain the spirit of the college's regulations as flexibly as possible and is empowered to make exceptions in cases in which regulations work to students' educational disadvantage.

Students are urged to consult a committee representative in their college office concerning almost any kind of problem, but especially those they think interfere with their ability to attain their academic objectives. Well-established petition and appeal procedures assure full review of student requests.

Repetition of High School Work—In CLA, students normally enroll for mathematics and second language courses for which high school work and the language proficiency test make them eligible. If students think they are not prepared to continue at such a level, they should consult their college office adviser about appropriate placement and course selection.

Late Cancellation—CLA students may receive one discretionary course cancellation after the cancellation deadline but before study day. This discretionary cancellation may be used only once during a student's enrollment at the University. Other late cancellations are approved by the Student Scholastic Standing Committee only when verified extenuating circumstances that prevent a student from completing a course arise after the cancellation deadline. Any cancellation, discretionary or otherwise, after the cancellation deadline must be requested by written petition in the student's college advising office.

Scholastic Conduct—CLA faculty may act on cases involving CLA students in their classes; such action may not exceed modification of a course grade. Instructors must report any action to the conduct committee, and the student is informed of the right to ask for a committee hearing. For information on report and appeal procedures, call the CLA Student Services assistant dean's office (612-625-3846).

Retention of Student Records—Official transcripts are maintained permanently by the Office of the Registrar. The college retains for 10 years the college files of upper division students who left CLA after earning 100 quarter college credits; college files of students who applied for graduation but did not graduate and of students who had filed a degree program plan (senior summary or balance sheet) are kept indefinitely. Student records of graduates are kept for two years following graduation.

In preparation for graduate school, students may store recommendations in permanent credential files, which are kept in the Career and Community Learning Center.

Graduation Requirements

General Credit Requirements

Credit Requirements—A minimum of 120 credits acceptable to the college are required for all CLA bachelor's degrees; 48 of these credits must be in 3xxx, 4xxx, and 5xxx courses.

To earn a CLA degree, students must earn at least 30 credits from the University of Minnesota, at least 24 of which must be taken after admission to the major and from CLA departments. Some programs require a minimum number of credits taken in the department offering the major. Consult the major program descriptions in this catalog for more information. Students must also complete 20 of their last 30 credits with University of Minnesota, Twin Cities coursework. Credits earned by examination may not be applied toward the required 30 credits.

Students must complete all campus, college, and program requirements with a minimum GPA of 2.00 in the major and a cumulative GPA of 2.00 or higher in all University coursework.

All degree programs require a C- or better in each course in the major or minor.

A total of 6 semester credits in applied music, physical education, and study skills courses may be applied toward the degree. Credits from typing, word processing, shorthand, first aid, and courses clearly remedial or vocational in nature may not be applied toward any credit requirements.

Credit will not be awarded twice for the same course or for two substantially similar courses.

Degree Requirements After an Absence—Students who have not attended CLA for more than two years must fulfill current graduation requirements.

If *less than two years* have passed since students last attended CLA, they are under the requirements applicable to them before their absence. Students who plan to leave the University for more than two semesters must request a leave of absence through their college advising office.

Liberal Education Requirements

The liberal education curriculum that applies to students' degree programs depends on the date they are admitted to CLA.

Twin Cities Campus Liberal Education Curriculum—The University of Minnesota, Twin Cities liberal education requirements apply to all students entering a baccalaureate degree program in fall 1996 and later. If students entered a degree program before fall 1996 and are uncertain whether or not the liberal education requirements apply, they should check with their academic adviser. See page 31 of this catalog for a description of the liberal education curriculum.

Second Language Requirement

The study of a second language is considered essential for a liberal education. CLA expects students to have begun second language study in high school or earlier.

In many cases, knowledge of a second language gained before entering CLA may be used to meet part or all of the language requirement. If students are unsure about their level of proficiency, they should consult their adviser or the language department for placement assistance. Normally, one to two years of high school language study equals one semester of college study.

Qualified students may meet part or all of the entrance and graduation requirements by passing examinations arranged with appropriate departments. (These proficiency examinations do not yield college credits.)

No credit is granted for first- or second-year courses in a student's primary language of secondary school instruction. Students who earn at least a C- in a Twin Cities campus language sequence course may request to have preceding courses in the sequence (second-semester level or higher) posted retroactively if they have not already received college credit for equivalent courses at another institution. Students should contact their advising office for more information.

Students planning on the B.A. degree should study a language for three years in high school.

CLA Entrance Requirement—All B.A., art B.F.A., and B.I.S. students who wish to register for French, German, or Spanish courses beyond the second semester must pass the appropriate entrance proficiency examination. Students who meet the entrance requirement may continue their study at higher levels in the same language or may begin study in another language. Contact the CLA Language Testing Program (612-624-0862) or see the Web site <www.langtest.umn.edu> for testing and placement information.

Graduation Requirement—The graduation requirement for the B.A., B.F.A. in art, and B.I.S. degrees requires students to demonstrate proficiency usually attained after the first four semesters of college study in one language by passing a graduation proficiency examination that tests reading, writing, listening, and speaking skills.

Languages for which second language requirement graduation proficiency examinations are available include American Sign Language, Arabic, Biblical Greek, Chinese, Classical Greek, Dakota, Danish, Dutch, Finnish, French, German, Hindi, Irish, Italian, Japanese, Latin, Marathi, modern Greek, modern Hebrew, Norwegian, Ojibwe, Polish, Portuguese, Russian, Spanish, and Swedish.

Advising

College advisers in academic departments and college offices offer students individual help in planning their studies and meeting other concerns they might have about college life. Students are assigned to a college advising office for assistance with course selection, registration, vocational and personal decisions, financial problems, and involvement in campus activities.

Based on their preferred interest or major, students are assigned to one of nine student communities (organized by groups of majors) where they remain throughout their CLA career. Students are also assigned to a specific team of advisers, including their academic adviser, peer adviser, major adviser, and a career services liaison. Basic services are designed to meet students' developmental needs, support students' search for fields of study appropriate to their visions and potential, monitor their academic progress, and help them to be more informed about their choices.

Wise use of the advising system can make students' college experience more satisfying and productive. Students should take pertinent records and materials to adviser appointments, and prepare for program planning sessions by giving careful thought to possible course selections, program schedules, and short- and long-term education and career goals and reviewing their transcript or computerized degree audit. Students should expect both support and challenge from their adviser.

CLA Student Services Offices

Students' college records are kept in their assigned student community; this community provides advising services and procedural information. To contact a student community or to find a major and its communities, see the Student Services Web site <www.cla.umn.edu/class/q1.php> or call the assistant dean's office for CLA Student Services (612-625-3846).

Advising for Special Programs

Honors Division—115 Johnston Hall (612-624-5522) <http://cla.umn.edu/honors/>

Martin Luther King Program—19 Johnston Hall (612-625-2300) <www.mlk.umn.edu/>

The Martin Luther King Program provides advising, support services, and instruction through tutorials, introductory course sections, support groups, computerized instruction, study skills workshops, and career seminars. Students enrolled in the program are encouraged to maximize their potential through educationally enriching learning experiences.

Special Learning Opportunities and Resources

Career and Community Learning Center (CCLC)

135 Johnston Hall and 345 Fraser Hall (612-624-7577) <www.cclc.umn.edu>

The Career and Community Learning Center (CCLC) coordinates career services, internships, community involvement, and service learning opportunities for CLA students and assists them with independent and directed study options. CCLC's Web site, "CLA Link" <www.cclc.umn.edu>, enables students to post their résumés online and search job, internship, and volunteer opportunities. CCLC administers various other programs such as the National Student Exchange, Metro Urban Studies Term (MUST), City Arts, and facilitates student participation in other domestic study programs.

Internships—Internships are an important vehicle for exploring questions and issues raised in the classroom. They allow students to gain experience in a particular field and learn more about possible career alternatives. Internships are available in all fields of study. Some are paid and others are volunteer opportunities. Internships are available in government, business, human services, science and technology, health care, ecology, education, the arts, broadcasting, and publishing.

Find out about undergraduate advising and student communities at <www.class.umn.edu>

Academic credit for learning acquired through internship experiences is available through several CLA departments, including some of the courses available under the Interdepartmental Study (ID) designator. Some financial support is available from the CLA Internship Grant Program, which funds students doing otherwise unpaid internships in the community. See a CCLC adviser for information on both credit and the grant program.

Service Learning—Community involvement and service-learning facilitates student and faculty involvement in local communities. Program goals include understanding social barriers and inequalities, learning practices of reflective leadership, contributing toward educational and personal growth, and enriching multicultural understanding. Community-based learning opportunities can be part of academic service-learning courses or done individually through CCLC to enrich an academic program. CCLC provides an annual community involvement fair which brings over 70 local organizations to campus. Students can select from a variety of opportunities and environments, including direct service work, advocacy, and organizing community-building activities in schools, community centers, health care settings, local arts organizations, and other nonprofit and government groups. Incoming first-year students interested in community work can choose to live in a service-learning house.

Alternative Credit Registration Options

Most departments offer opportunities for independent study of regular courses or subjects not covered in the curriculum. For general information and permission forms, contact the CCLC office. Independent study is completed under the direction of a faculty member. Registration for this course requires instructor, department, and college approval.

Y Registration—Students enroll in an established course and study independently without attending class. Each student and instructor agree on conditions for examinations and coursework. Regular fees, deadlines, and grading policies apply.

X Registration—Students earn extra credits in a course they are taking or have previously taken, by exploring more deeply a topic related to the course's content.

Contact your department or the CCLC office for information about other alternative credit registration options.

FLAC and FLIP

Foreign Languages Across the Curriculum (FLAC)—FLAC allows students to apply their knowledge of a second language to the study of a particular discipline. FLAC courses attach a one credit language "trailer" to an existing course. In addition to regular English language coursework, students participate in a section meeting conducted in a second language.

Foreign Language Immersion Program (FLIP)—FLIP gives students an opportunity to strengthen their language skills in French, German, or Spanish by offering courses taught entirely in a second language. FLIP students can experience immersion by carrying an entire semester course load (typically 15 credits) in French, German, or Spanish. Alternatively, students may elect to enroll in only a portion of the FLIP.

For further information about FLAC or FLIP, please contact the Institute of Global Studies at 612-624-9007.

Special Achievement

Each semester, the college publicly recognizes superior academic performance through transcript memoranda, notices posted on the first floor of Johnston Hall, and announcements to academic departments.

To appear on the *Dean's List*, students must complete at least 12 credits of A-F registration and earn a semester GPA of at least 3.67.

College of Continuing Education registrations are included in assigning these honors. If students believe they qualify for either list but are not included, they should contact the CLA Assistant Dean for Student Services office in 106 Johnston Hall (612-625-3846).

International Programs

CLA credit for study abroad may be earned through independent study or a variety of formal programs. See information on study abroad options in the General Information section of this catalog or contact the Global Campus, 230 Heller Hall (612-626-9000).

Career Information

Career services are provided by the Career and Community Learning Center (CCLC), 135 Johnston Hall and 345 Fraser Hall (612-624-7577).

Career Services—The skills and experience for developing and later managing a career need to be learned while students are in school. CLA provides assistance to current students and alumni in relating academic interests to career options, identifying career goals, and learning effective job-hunting skills. CLA emphasizes involvement in the kinds of experience students will need to be competitive in the work world of the 21st century.

CCLC provides workshops and individual assistance on résumé writing, interviewing, job-hunting, and networking; courses on career exploration and strategic career planning; a career resource center offering computer access and reference materials for occupation and company research, and World Wide Web and other online career resources; and an annual career day. Students are encouraged to use these services and resources throughout their college career and afterward.

Graduate and Professional School Assistance—Many CLA graduates choose to attend graduate or professional schools. CCLC provides an annual graduate and professional school fair, workshops on how to apply for graduate study and other topics, graduate school information, prelaw advising, and graduate and professional school credential files for students actively involved in the application process.

Student Organization

Student Board

12 Johnston Hall (phone 612-626-0348, clasb@umn.edu <www.tc.umn.edu/~clasb/>)

The College of Liberal Arts Student Board (CLA-SB) is the college's student governance body. The board is the official channel through which recommendations from the CLA student body are brought to the college.

CLA-SB also represents students with seats on many committees and deals with nomination or election of students to seats on many others. These governing councils and committees collectively deal with virtually all aspects of CLA policy.

One primary responsibility of CLA-SB is to maintain contact with department student organizations.

All students are encouraged to participate in the operations of the board and to contribute to decisions affecting the college. The board is composed of elected and appointed members. The board recognizes and practices affirmative action.

Directory

(area code 612)

Department of African American and African Studies
808 Social Sciences Building
624-9847

Department of American Indian Studies
2 Scott Hall
624-1338

Department of American Studies
104 Scott Hall
624-4190

Department of Anthropology
395 Hubert H. Humphrey Center
625-3400

Interdisciplinary Archaeological Studies
395 Hubert H. Humphrey Center
625-1062

Department of Art
208 Art Building
625-8096

Department of Art History
338 Heller Hall
624-4500

Department of Asian Languages and Literatures
453 Folwell Hall
624-4180

Center for Austrian Studies
314 Social Sciences Building
624-981

Department of Chicano Studies
2 Scott Hall
624-6309

Classical Civilization Program
300 Folwell Hall
625-7565

Department of Classical and Near Eastern Studies
305 Folwell Hall
625-5353

Center for Cognitive Sciences
205 Elliott Hall
625-9367

Department of Communication Disorders
115 Shevlin Hall
624-3322

Department of Communication Studies
225 Ford Hall
624-5800

Department of Cultural Studies and Comparative Literature
350 Folwell Hall
624-8099

Center for Early Modern History
715 Social Sciences Building
624-9813

Department of Economics
1035 Heller Hall
625-6353

Department of English
207 Lind Hall
625-3363

Minnesota English Center
315 Nolte Center for Continuing Education
624-1503

European Studies Consortium
214 Social Sciences Building
624-9007

Center for Advanced Feminist Studies
414 Ford Hall
624-6310

Department of French and Italian
260 Folwell Hall
624-4308

Department of Geography
414 Social Sciences Building
625-6080

Department of German, Scandinavian, and Dutch
205 Folwell Hall
625-2080

Institute for Global Studies
214 Social Sciences Building
624-9007

- ***Center for German and European Studies***
  309 Social Sciences Building
  625-1557
- ***Modern Greek Studies***
  325 Social Sciences Building
  624-4526

Department of History
614 Social Sciences Building
624-2800

Center for Holocaust and Genocide Studies
100 Nolte Center for Continuing Education
626-2235

Humanities Institute
101 Nolte Center for Continuing Education
624-7032

Humanities Program
831 Heller Hall
625-6365

Immigration History Research Center
311 Anderson Library
625-4800

Individualized Degree Programs
345 Fraser Hall
624-8006

Center for Interdisciplinary Studies of Writing
227 Lind Hall
626-7579

Dworsky Center for Jewish Studies
330 Folwell Hall
625-5353

School of Journalism and Mass Communication
111 Murphy Hall
625-9824

- ***China Times Center for Media and Social Studies***
  400 Murphy Hall
  626-7446
- ***Minnesota Journalism Center***
  421 Murphy Hall
  625-3480
- ***Silha Center for Study of Media Ethics and Law***
  421 Murphy Hall
  625-3421

Center for Advanced Research on Language Acquisition
1313 5th Street S.E., Minneapolis
627-1870

Language Center
51 Folwell Hall
624-6811

Institute of Linguistics, ESL, and Slavic Languages and Literatures
214 Nolte Center for Continuing Education
624-3331

MacArthur Interdisciplinary Program on Peace and International Cooperation
260 Social Sciences Building
624-0832

Center for Medieval Studies
131 Nolte Center for Continuing Education
626-0805

School of Music
200 Ferguson Hall
624-5093

Department of Philosophy
831 Heller Hall
625-6563

Minnesota Center for Philosophy of Science
746 Heller Hall
625-6635

Center for Political Psychology
1282 Social Sciences Building
624-0864

Department of Political Science
1414 Social Sciences Building
624-4144

Department of Psychology
N218 Elliott Hall
625-4042

Religious Studies Program
330 Folwell Hall
625-5353

Social Science Research Facility
25 Blegen Hall
625-8556

Department of Sociology
909 Social Sciences Building
624-4300

- ***Life Course Center***
  1014 Social Sciences Building
  624-6333

Department of Spanish and Portuguese Studies
34 Folwell Hall
625-5858

School of Statistics
313B Ford Hall
625-8046

- ***Applied Statistics***
  146 Classroom-Office Building
  625-7030
- ***Statistical Center***
  146 Classroom-Office Building
  625-8777
- ***Statistical Clinic***
  146 Classroom Office Building
  625-3121
- ***Theoretical Statistics***
  313B Ford Hall
  625-7300

Department of Theatre Arts and Dance
580 Rarig Center
625-6696

- ***Dance Program***
  Barbara Barker Dance Center
  624-5060
- ***University Theatre***
  110 Rarig Center
  625-5380

Urban Studies Program
348 Social Sciences Building
626-1626

Department of Women's Studies
425 Ford Hall
624-6006

Student Board
12 Johnston Hall
626-0348

CLA students can take advantage of over 1,300 different internship programs through the Career and Community Learning Center (CCLC).

College of Liberal Arts

Degree Programs and Minors

African American and African Studies

Department of African American and African Studies

B.A.

This major offers three curriculum tracks. Students choose one track and usually select a concentration such as public policy/development studies, literature and the arts, or a more traditional disciplinary focus. The integrated studies of African people track focuses on African peoples and cultures of Africa and the western hemisphere. The African American studies track provides a comprehensive knowledge of African American history, psycho-social issues, and culture. The African studies track focuses on the history, social sciences, and cultures of Africa. All three tracks encourage students to study a language related to Africa and to take advantage of opportunities to study and work there.

Preparatory Coursework—Depending on their chosen track, all students complete Afro 1011—Introduction to African American Studies or Afro 1021—Introduction to Africa.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 30 credits in the major.

Students complete 30-36 3xxx, 4xxx, or 5xxx course credits, including a 3xxx, 4xxx, or 5xxx statistics or methods course approved by the undergraduate adviser; sequences in African–American history and/or African history; 12 credits in group concentration and 6 credits outside the concentration; at least 3 credits from a course that examines gender issues; one 4xxx or 5xxx seminar or proseminar; and a senior paper. Students may receive a maximum of 2 credits toward the major for approved domestic or foreign internships. Specific requirements vary depending on selected track. Consult the student handbook of the Department of African American and African Studies for details. Students selecting this major should consult with the undergraduate adviser to establish an approved program.

Language Requirements

CLA language requirement must be met in one of the following languages: French, German, Dutch, Portuguese, Spanish, Arabic, Swahili.

Final Project

An approved senior thesis represents the culmination of a student's degree program and should develop from the concentration defined by earlier coursework. Students work with a selected faculty member over two semesters and must register for Afro 3991-3992—Senior Paper. An annotated bibliography and thesis statement should be completed by the end of the first semester, and a final draft completed midway through the second term. The final paper must be submitted to the director of undergraduate advising for inclusion in the department's collection. Students register for Afro 3991-3992—Senior Paper.

African American and African Studies Minor

Students must satisfactorily complete 15 credits from 3xxx, 4xxx, or 5xxx courses. For approved internships students may receive up to 2 credits toward the minor.

American Indian Studies

Department of American Indian Studies

B.A.

American Indian studies provides a multidisciplinary understanding of the history and present situation of the native peoples of the United States and Canada. The program emphasizes the American Indian history, culture, language, literature, the arts, philosophy, religion, political and social forces, and the legal status and sovereignty of tribal nations. Two tracks in the major (language focus and non-language focus) and a minor are offered.

Preparatory Coursework—Students take AmIn 1001—Indigenous Peoples: An American Perspective.

Degree Requirements

Students must complete at least 120 credits to graduate, including AmIn 1001—Indigenous Peoples: an American Perspective or AmIn 1002—Indigenous Peoples: A Global Perspective and at least 30 additional credits in the major. Both language and non-language focus students must take courses from Group 2: Tribal Arts and Humanities, Group 3: Culture and History, and Group 4: Political and Social Issues. All students must also complete a senior project.

Required Courses

Language Focus

Four-course (20 credits) sequence in Dakota (AmIn 1101-1102-3103-3104) or Ojibwe (AmIn 1121-1122-3123-3124) language

At least 14 more credits, including at least 3 credits from each of the following:

Group 2—AmIn 3201, 3301, 3303, 3401, 4201, 4402

Group 3—AmIn 3409, 3701, 3711, 3871, 3872, 3876, 4721

Group 4—AmIn 3501, 4501, 4511, 4515, 4525

Non-Language Focus

At least 30 credits, including at least 6 credits from each of the following:

Group 2—AmIn 3201, 3301, 3303, 3401, 4201, 4402

Group 3—AmIn 3409, 3701, 3711, 3871, 3872, 3876, 4721

Group 4—AmIn 3501, 4501, 4511, 4515, 4525

Final Project

The CLA senior project requirement may be satisfied by any one of the following courses: AmIn 4991, 4994, or 4996.

American Indian Studies Minor

Students take AmIn 1001—Indigenous Peoples: an American Perspective or AmIn 1002—Indigenous Peoples: A Global Perspective and at least 15 upper division credits approved by the department adviser, including at least 3 credits from each of the following.

Group 2—AmIn 3201, 3301, 3401, 4201, 4402

Group 3—AmIn 3701, 3711, 3871, 3872, 3876, 4721

Group 4—AmIn 4501, 4511, 4515

American Studies

Program in American Studies

B.A.

American studies is the interdisciplinary study of American culture(s). Students study U.S. cultures and their interactions and explore the major issues and problems of American society by examining the arts, history, politics, and literature of the diverse peoples of the United States.

Preparatory Coursework—Students take two of the following background courses: AmSt 1001, 1002, 3111, 3113.

Degree Requirements

To complete the B.A., students must complete at least 120 credits. A minimum of 39 of these credits must include courses in American studies, literature, and history, plus one course in world cultures. Four courses within this major sequence must be concerned with ethnic or women's studies. Some internships may be used to satisfy major requirements.

Required Courses

AmSt 3299—Junior Proseminar

AmSt 3301-3302—Senior Proseminar

Electives—These courses are chosen by the student in consultation with the undergraduate adviser. Many courses in a variety of departments are possible, but the student is expected to choose courses forming a coherent course of study, including one course at 3xxx or above that focuses on a non-U.S. culture or society.

Final Project

All seniors must complete a thesis written in conjunction with the senior proseminar (AmSt 3301-3302).

American Studies Minor

Students take at least 15 credits of American studies courses. All courses must be at 3xxx or above, with a grade of C- or better.

Ancient Near Eastern Studies

Department of Classical and Near Eastern Studies

B.A.

The study of the ancient Near East is the study of the civilizations of ancient Mesopotamia, Syria, Israel, Egypt, and Persia. Students study the languages, literatures, and material remains of the great civilizations of the fertile crescent that have made lasting contributions in law, religion, myth, monumental architecture, art, and the sciences.

Preparatory Coursework—Students intending to major in ancient Near Eastern studies are required to complete Afro 3102—Intermediate Arabic II or Hebr 3012—Intermediate Hebrew II.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 30 credits in the major. These credits include an additional Near Eastern language from the list below, courses chosen from anthropology, archaeology, art history, linguistics, literature, and completion of a major project.

Required Courses

Language (one of the following two-course sequences)

Akka 5011-5012

Arm 5011-5012

Copt 5001-5002

Sum 5011-5012

Art History and Archaeology

Clas 3008—History of Ancient Art

Class 3088 or 3089—Archaeology in Biblical Lands

ArtH 3142—Art of Egypt

Social Sciences (two courses from the following)

Anth 3001, 3009, 3011

Linguistics

Ling 3001—Introduction to Linguistics

Ling 3601—Introduction to Historical Linguistics

Final Project

A major project is required, including registration in ANE 3951 (1-4 cr). Double majors in ancient Near Eastern studies and Hebrew complete only one project. The project generally takes the form of a paper, but other forms of a project may be considered.

Anthropology

Department of Anthropology

B.A.

Anthropology is the study of human beings—past, present, and around the world. It covers human origins and evolution, past societies, and the diverse cultural practices and languages of living groups. By exploring human nature, and by trying to understand people as they live and develop in different social, cultural, and ecological settings, anthropology also stimulates us to become more thoughtful about our own society and lifestyles as well as those of people in other parts of the world. Anthropologists play a leading role in inquiries into human nature and influence discussions of ethnicity, gender, inequality, popular culture, and the effects of the global economy and mass culture. The program's goal is to provide instruction and support to undergraduates to enable them to think critically about society and culture and to utilize this training in their working lives.

Preparatory Coursework—Students must complete Anth 1001—Human Evolution and either Anth 1003W—Understanding Cultures or Anth 1005W—Introduction to Cultural Diversity and the World System with a grade of C- or better.

Degree Requirements

Students must complete at least 30 credits in the major. In general, all students take introductory-level courses in both sociocultural anthropology and archaeology. Students concentrating in archaeology take Anth 3001; students concentrating in sociocultural anthropology take Anth 3003. All students complete either a senior seminar, for which they write a substantial research paper, or an individualized senior research project supervised by a faculty member. All students take five electives.

Required Courses

Introductory Courses

Anth 1001/1001H—Human Evolution

Anth 1003W/1003V—Understanding Cultures

or Anth 1005W/1005V—Introduction to Cultural Diversity and the World System

Basic Method and Theory Courses (two courses)

Anth 3001—Introduction to Archaeology

Anth 3003—Cultural Anthropology

Anth 3005—Language and Sociocultural Analysis

CLA offers more than 60 majors and preparation for 16 professional degree programs.

Senior Seminar/Project

Anth 4011—Senior Seminar

or Anth 3913—Senior Project Planning

and Anth 4013—Senior Project

Note: Honors students must take Anth 3913 and 4013.

Anthropology Electives

Five courses; at least one from each of the following three categories. Three of the five required electives must be 4xxx or 5xxx courses.

Approaches to anthropology—Anth 3007, 3009, 3041, 3221, 3310, 4001, 4003, 4019, 4021, 4023W, 4025, 4031, 4035, 5025W, 5029, 5033, 5041, 5244

Ethnographic and regional studies—Anth 3010, 3011, 3013, 3017, 3020, 3023, 3025, 3027W, 3028, 3029, 3031, 4043, 4045, 4047, 5027W

Institutions and issues—Anth 3035, 3041, 3043, 3047W, 4045, 4051, 4053, 4057, 4061, 4065, 4067, 4069, 4071, 4075, 5045, 5128

Elective requirements may be at least partially satisfied by Anth 4991—Independent Study, Anth 4992—Directed Readings, Anth 4993—Directed Study, Anth 4994W—Directed Research and Anth 3310, 3980, 4980, 4990, 5980, 5990—Topics courses.

Final Project

Anth 4011—Senior Seminar or Anth 3913—Senior Project Planning and Anth 4013—Senior Project. For Anth 3913 (1 credit) and 4013, students complete an individualized research project, which they design and conduct, under the supervision of a faculty member. Honors students must take Anth 3913 and 4013.

Anthropology Minor

Introductory Courses

Anth 1001/1001H—Human Evolution

Anth 1003W/1003V—Understanding Cultures

or Anth 1005W/1005V—Introduction to Cultural Diversity and the World System

In addition, students take four 3-credit anthropology courses that have a common focus at 3xxx or above. Specific coursework is determined in consultation with the director of undergraduate studies.

Architecture

Department of Architecture

B.A.

See the College of Architecture and Landscape Architecture section for the bachelor of science degree with a major in architecture.

Architecture encompasses the making and study of the buildings and environment that we inhabit. The concerns of architecture involve a wide variety of areas of study including the art of representing built projects through drawings and computer graphics; the technology of building structure, building materials, and natural and mechanical systems; the history, theory, and art of making, using, and understanding buildings as cultural artifacts for human use; and the practice of architecture in the context of urban form and business economics.

The bachelor of arts (B.A.) degree with a major in architecture provides instruction in history, representation, design, theory, and emphasizes the development of architecture as a language of form, space, and order. The program requires an understanding of social, cultural, and physical contexts as a foundation for the examination of the methods, values, precedents, and material reality characteristic of the process of shaping natural and built environments. The major combines core prerequisites with a broad introduction to architecture, including required courses in representation, history, theory, and design processes.

The program introduces the study of architecture in the context of a liberal arts education. It may be used as preparation for professional study in architecture or related fields at the graduate level, or for employment in architecture related fields that do not require a professional degree. The undergraduate major establishes a design foundation that serves a diversity of careers, and provides flexibility as individual opportunities change. A master's degree in architecture is required to qualify for licensure in Minnesota.

Beginning fall 2002, all CALA students in studio classes must have a laptop computer. For the most current information about computer requirements, visit the CALA Web site at <www.cala.umn.edu/>.

Admission Requirements—Students apply to the major the semester they will complete 55-60 credits, including all preparation courses. Students are admitted to the major based on space availability and academic record. A minimum GPA of 2.50 is required and a 2.80 GPA is recommended.

Application deadlines are November 1, March 1, and August 1. Students complete the following steps before an application deadline:

1. Complete all required architecture and general education courses listed under "Preparation for the Major" and liberal education requirements totaling a minimum of 55-60 credits (may include current enrollment).
2. Meet with their CLA adviser to complete the Pre-Architecture Planning Sheet. (CLA Society & Culture Student Community, 122 Johnston Hall, 612-624-2549; Martin Luther King Program (MLK), 19 Johnston Hall, 612-625-2300; CLA Honors Program, 115 Johnston Hall, 612-624-5522)
3. Meet with a Department of Architecture undergraduate adviser in the College of Architecture and Landscape Architecture (CALA) Office of Student Services, 612-626-1000. Bring a copy of the completed Pre-Architecture Planning Sheet and a current unofficial transcript to the appointment. Students should be prepared to state the courses they will take for their concentration or minor.

Students interested in taking CALA courses but not earning a degree should enroll in CALA as a non-degree seeking student through the Office of Admissions.

Degree Requirements

To complete the degree, students must complete at least 120 credits: 60 credits of pre-architecture study followed by 60 credits of coursework after admission to the major. At least 42 credits must be in the major.

During their architectural studies, students should maintain a portfolio of originals or duplications of all freehand drawings, projects, and architecture studio designs. A portfolio is required for application to the graduate professional degree program.

All architecture-designated courses (Arch) and the required general education courses in math, physics, and English composition must be taken A-F with grades of C- or better to satisfy degree requirements and to progress in sequence courses.

Required Courses

Preparation for the Major (31 cr)

Required General Education Courses (13 cr)

EngC 1011—University Writing and Critical Reading (4 cr)

Math 1142—Short Calculus (4 cr)

or Math 1271—Calculus I (4 cr)

Phys 1101—Fundamental Physics I (4 cr)

or Phys 1201—General Physics I (5 cr)

Architecture Courses (18 cr)

Representation

Arch 1301—Introduction to Drawing in Architecture and Landscape Architecture (3 cr)

History and Theory

Arch 1401—The Designed Environment (3 cr)

Arch 3401W—Environmental Design and the Sociocultural Context (3 cr)

Arch 3411—Architectural History to 1750 (3 cr)

Arch 3412—Architectural History since 1750 (3 cr)

LA 3501—Environmental Design and its Biological and Physical Context (3 cr)

Architecture Major Requirements (24 cr)

Representation

Arch 3301—Drawing for Design in Architecture (3 cr)

Design

Arch 5281—Undergraduate Architecture Studio I (6 cr)

Arch 5282—Undergraduate Architecture Studio II (6 cr)

Electives

Arch 3xxx-5xxx—Student's choice within area of interest including at least one Arch 5xxx history course (9 cr min)

Concentration or Minor

B.A. majors complete a concentration (18-credit minimum) of 3xxx-5xxx courses outside the major, or a minor outside the major, as a means to broaden the social, cultural, and international aspects of their interest area. Any formal University minor will satisfy this requirement. Courses for a concentration are chosen from various disciplines that impact design decisions (e.g., economics, geography, housing, natural resources, and urban studies). Developing and selecting courses for the concentration is the responsibility of the individual student but must be done in consultation with an architecture adviser. The student must present the concentration or minor when applying to the major because it becomes an integral part of the *Major Program Form*. As individual goals change, the approved concentration or minor may be revised by consulting the CALA Office of Student Services and amending the *Concentration Program Form*.

Accelerated Status in Architecture

This status is a competitive opportunity for qualified undergraduates to complete the B.A. degree with a major in architecture and the M.Arch. degree in six years rather than seven. Accelerated status applicants must complete all but 14 credits of upper division architecture courses before their senior year.

In this program students complete the first year of the graduate professional degree program in their senior year; courses carry upper division credit. Admission to accelerated status does not guarantee admission to the graduate professional program; separate requirements, such as the Graduate Record Examination (GRE) and other application documents, must be submitted in January of the year admission to the graduate program is sought. For more information about accelerated status, consult the Department of Architecture director of undergraduate studies or CALA Office of Student Services.

To be considered for accelerated status, students must be enrolled at the University as a B.S. or B.A. major in architecture, have completed one year of architecture design studio (Arch 5281, Arch 5282), have completed 90 credits, and have earned an overall GPA of 3.50. See an adviser in CALA Office of Student Services for additional criteria. Deadline for consideration is March 15.

Architecture Minor

An undergraduate minor in architecture introduces the foundational ideas of the discipline as a social, cultural, historic, and environmental construct. The minor requires a minimum of 18 credits. A minimum grade of C- is required in all courses taken for the minor. Nine of the 18 credits are in three required courses:

Arch 1401—The Designed Environment (3 cr)

Arch 3401W—Environmental Design and the Sociocultural Context (3 cr)

LA 3501—Environmental Design and its Biological and Physical Context (3 cr)

Nine credits are open to the student's selection within an interest area and must be in upper division Arch courses (3xxx-5xxx). See an adviser in CALA Office of Student Services, 107 Architecture for more information and to declare the minor. A maximum of 9 transfer credits may be used toward the minor. A maximum of three courses taken for a major degree may also be used toward the minor.

Art

Department of Art

The Department of Art offers two undergraduate degrees: a bachelor of arts (B.A.) and a bachelor of fine arts (B.F.A.).

The B.A. program provides instruction in the visual arts by emphasizing the development of visual awareness and expression through hands-on involvement in the creative process. In the introductory studio courses, students become familiar with the various materials and concepts used to understand the nature of the visual language. Students then choose additional courses from such areas as drawing, painting, ceramics, printmaking, electronic art, photography, sculpture, papermaking and book arts, and the critical theory of art.

The B.F.A. is a selective art program providing in-depth instruction in the visual arts through a high concentration of coursework in the Department of Art. Admission is based on portfolio evaluation. The B.F.A. is oriented toward professional practice or admission to a master's degree program.

B.A.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 38 credits in the major.

Art majors complete four core (1xxx) courses, at 4 credits each, including the introductory course in visual arts, a course in two-dimensional expression, a course in three-dimensional concepts, and a course in a reproducible media.

Major coursework requires a minimum of 15 credits (usually four courses) at 3xxx or above (one course may be at 1xxx), and two courses in the history of art. Majors have the opportunity to concentrate in a media if they choose, or they may diversify their interests in the visual arts by expanding on the broad based core requirements at the upper level. All major coursework must be taken A-F. Only grades of C- or better will apply to the major.

Registration for a major project (1 credit) is required in the senior year.

Required Courses

ArtS 1001W—Introduction to Visual Arts

Two-dimensional expression:
ArtS 1101—Drawing

Three-dimensional concepts:
ArtS 1301—Sculpture
or ArtS 1801—Ceramics

Reproducible media:
ArtS 1501—Printmaking
or ArtS 1601—Electronic Art
or ArtS 1701—Photography

15 cr ArtS 3xxx or above

6 cr ArtH (3 cr must be 3xxx or above)

All courses from the Department of Art History may apply to the art history requirement in the major. Adviser-approved, individual courses from the Departments of American Indian Studies, Anthropology, History, Cultural Studies and Comparative Literature, and Women's Studies may also be applied to the art history requirement as they concern issues and topics germane to the history of the visual arts.

Final Project

Registration for ArtS 3444—Major project (1 cr) is required in the senior year.

B.F.A.

Admission Requirements—Art majors may apply to the B.F.A. degree track after completing the five core courses required in the major. Application is made by submitting a portfolio to a faculty committee. A faculty adviser is chosen upon admission to the B.F.A. program.

Degree Requirements

To complete the B.F.A., students must complete at least 126 credits, including at least 68 credits in the major. Because the B.F.A. track includes the same liberal education requirements as the B.A., including proficiency in a second language, there is an increase in total credits.

Students complete five core (1xxx) courses at 4 credits each, including the introduction to visual arts, a course in drawing, a course in three-dimensional concepts, a course in the reproducible media, and an elective 1xxx ArtS course.

Major coursework requires a course in critical theory from a related discipline, ArtS 5400 (3 credits), three courses in the history of art, an internship experience (1-3 credits), and a minimum of 30 credits in art at 3xxx or above.

An internship with a local or national art organization or an apprenticeship with an established artist recognized in the field is required, usually in the junior or senior year.

In their final semester, B.F.A. candidates participate in a solo or small group exhibition that is reviewed by faculty.

All coursework for the major must be taken A-F. Only grades of C- or better apply to the major.

Required Courses

Arts 1001W—Introduction to Visual Arts

Two-dimensional expression: Arts 1101—Drawing

Three-dimensional concepts: ArtS 1301—Sculpture
or ArtS 1801—Ceramics

Reproducible media: ArtS 1501—Printmaking
or ArtS 1601—Electronic Art
or ArtS 1701—Photography

ArtS 3496—Internship in the Arts

ArtS 5400—Seminar: Concepts and Practices in Art

30 cr ArtS 3xxx or above

9 cr ArtH (6 cr must be 3xxx or above)

A course in critical theory from a related discipline (as approved by the department)

All courses from the Department of Art History may apply to the art history requirement in the major. Adviser-approved, individual courses from the Departments of American Indian Studies, Anthropology, History, Cultural Studies and Comparative Literature, and Women's Studies may also be applied to the art history requirement as they concern issues and topics germane to the history of the visual arts.

Final Project

B.F.A. candidates must participate in a solo or small group exhibition at an adviser-approved gallery or exhibition space during the final semester.

Art Minor

A minor in art introduces students to the creative process and visual thinking. All minor coursework must be taken A-F. Only grades of C- or better will apply to the minor. The undergraduate minor in art requires a minimum of 20 credits, as follows:

ArtS 1001—Introduction to Visual Arts (this course must be completed before taking any upper level art courses).

One course from the 1xxx ArtS electives (1101, 1301, 1501, 1505,1601, 1701, 1801)

Three ArtS courses at 3xxx or above (must have appropriate prerequisites). One of these elective courses may be an additional 1xxx elective if a second media area is desired.

One elective course in art history at 3xxx or above.

Art History

Department of Art History

B.A.

Using a wide variety of methodological approaches, art history faculty help students develop an awareness and knowledge of the visual environments from all periods of history.

All 1xxx courses and most 3xxx courses do not have prerequisites and are intended for general audiences. Students who intend to apply for graduate school are strongly encouraged to take as many 5xxx courses from as many different professors as possible.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 29 credits in the major. All courses used to fulfill major requirements must be taken A-F; independent study courses may not be used.

Required Courses

One course (4 cr) in art practice (consult the director of undergraduate studies)

Three courses (12 cr) selected from the following: ArtH 3005, 3008, 3009, 3011, 3012, 3013, 3014, 3015, 3921

Four additional art history lecture courses (minimum of 12 cr), including at least two 5xxx courses.

Electives—Some courses from the Departments of American Indian Studies, American Studies, Architecture, Classical Civilization, Classical and Near Eastern Studies, East Asian Studies, and Medieval Studies may be applied toward the major. Consult the director of undergraduate studies.

Final Project

ArtH 3971—Major Project or ArtH 3973—Honors Major Project (1 cr). In this course, the research paper required for any 5xxx course or for the junior-senior seminar is developed into a major project, a polished research paper of about 15 pages with notes, bibliography, and illustrations.

Art History Minor

The art history minor consists of at least 18 credits distributed as follows:

Three courses (12 cr) selected from the following: ArtH 3005, 3008, 3009, 3011, 3012, 3013, 3014, 3015, 3921

Two 5xxx art history lecture courses (minimum of 6 cr)

All courses for the minor must be taken A-F; independent study courses may not be used.

Asian Languages and Literatures

Department of Asian Languages and Literatures

B.A.

Asia is an increasingly important part of world politics, economics, and culture. A major in Asian languages and literatures (ALL) prepares students to interact with the people and cultures of Asia.

Students in the Asian languages and literatures program study an Asian language—Chinese, Hindi, Hmong, Japanese, Korean—as well as methods of literary and cultural analysis. The language study provides advanced spoken and written skills that allow students direct access to both the people and cultures of Asia where over half the world population lives. The analytical courses give students a theoretically sophisticated understanding of the rich literary and cultural texts—from the accepted literary canon to popular culture and film.

The major has three concentrations—Chinese, Japanese, South Asian—each of which introduces a broad range of language, literary, and cultural texts. Along with ALL concentration courses, students take related electives outside the department and should take at least one course related to another area of Asia. The deeper, concentrated study in upper level courses, leads to the senior project. Study abroad is strongly encouraged and can contribute credit to the major.

Preparatory Coursework—The Graduation Proficiency Test in Chinese, Hindi, or Japanese or an equivalent level of demonstrated proficiency in the language as determined by the appropriate language program.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 35 credits in the major beyond the preparatory coursework.

Required Courses

ALL 3100—Introduction to Asian Literature

Two semesters (8 credits) of advanced language training (third level or above) in the same Asian language, either modern or its classical analogue. Students with advanced ability in the language will substitute 5xxx literature/culture courses offered by the department in lieu of the major language requirement.

Three courses (9-12 credits) in one Asian literature/culture offered by the Department of Asian Languages and Literatures that are of the same or related designator as the language of the student's area of concentration (Chn, Hndi, SALC, Jpn). The courses must include both modern and classical with at least one course at 5xxx. Language courses do not apply.

Three courses (9-12 credits) in at least two of the following areas: advanced Asian language, Asian literature/culture, Asian linguistics, Asian history, or other Asian-related courses in the humanities or social sciences. Normally these would be in the area of the student's concentration, but they could come from other courses with director of undergraduate studies approval.

One Asian literature/culture or Asian linguistics course, or two semesters of an Asian language, that is not in the concentration (3-10 credits). With director of undergraduate studies approval, this course can come from outside the Department of Asian Languages and Literatures.

ALL 4900W—Major Project (1 credit) is usually taken in conjunction with an advanced language or literature course in the senior year.

Other Asian language or literature/culture courses to meet the 35-credit requirement.

Students with native or near-native ability in an Asian language are encouraged to study another Asian language; if not, they will do their coursework in literature and related fields, to complete the equivalent credits in the major or minor.

Electives

Students are strongly encouraged to take courses with a focus on Asia in related disciplines.

Language Requirements

The program requires two semesters of study beyond the four-semester CLA language requirement. Four semesters of advanced language study is highly recommended.

Final Project

A major project is required of all majors, including registration in ALL 4900W during the senior year. Project proposals must be approved by the faculty adviser and the department chair prior to beginning the project and registering for ALL 4900W. The project generally takes the form of a paper, but other forms of project may be considered. The final project must be reviewed and approved by the faculty adviser.

Asian Languages and Literatures Minor

Four semesters (any level) of one Asian language (Chinese, Hindi, Japanese, or Korean).

ALL 3100—Introduction to Asian Literature

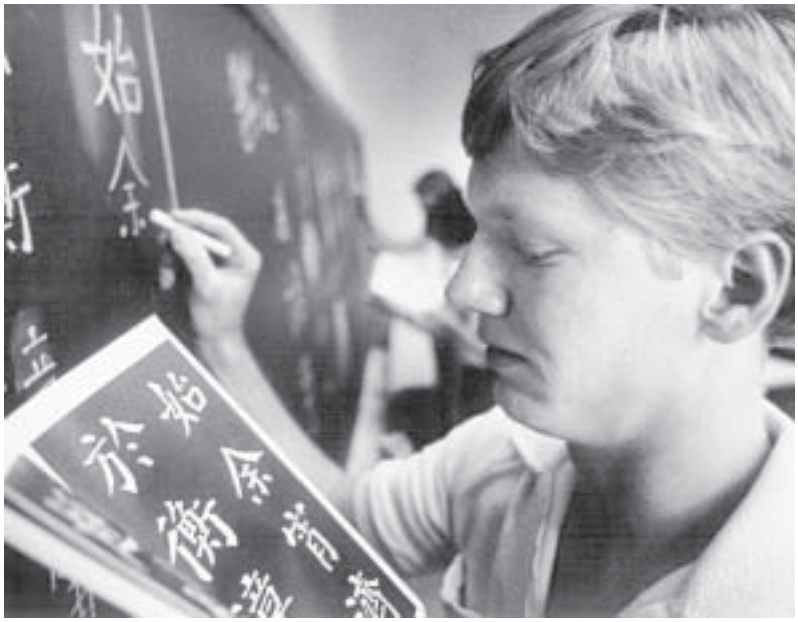
Two upper division courses in one Asian literature/culture that are of the same or related designator (Chn, Hndi, SALC, Jpn, Kor) as the language of the student's area of concentration.

Astronomy

Department of Astronomy

B.A.

The program develops the skills necessary to tackle complex and ill defined problems within the physical sciences. The astronomy program prepares students for careers in several broad areas. The B.A. is aimed primarily at students interested in secondary education in the physical sciences, science policy, and science and technical writing. The B.A. can also prepare students to continue their studies in astronomy in graduate school as well.



Preparatory Coursework—Students take Math 1271-1272 or Math 1371-1372 or Math 1571-1572 (8-10 cr); Math 2243 and 2263 or Math 2373 and 2374 or Math 2573 and 2574 (8 cr); and Phys 1301-1302-2503 or Phys 1401-1402-2403 (12 cr) before being admitted to the major. Ast 1011—Exploring the Universe, Honors is recommended but not required.

Degree Requirements

To complete the B.A., students must complete at least 120 credits. The number of credits completed in the major varies depending on a student's specialization, but at least 15 credits must be taken with the Ast designator.

The astronomy degree has several different tracks depending on the area of specialization the student wishes to pursue. Each of these tracks has the same core math, physics, and astrophysics requirements. In addition to these core courses, each track requires additional credits specific to the area of specialization. These tracks are: secondary education, science writing, science policy, and scientist.

The senior thesis (Ast 4994) should be related to the area of specialization, and need not be astrophysics research.

Required Courses

Ast 2001—Introduction to Astrophysics (4 cr)
Phys 2201—Introductory Thermal and Statistical Physics (2 cr)
Phys 2601—Quantum Physics (4 cr)
Phys 2605—Quantum Physics Laboratory (3 cr)
Phys 4001—Analytical Mechanics (4 cr)
Phys 4002—Electricity and Magnetism (4 cr)
Two 4xxx or 5xxx courses in astronomy (8 cr)
Area of specialization (approximately 12 cr)

Electives—Additional credits in the area of specialization within the degree program may be required. For example, secondary education in the physical sciences requires additional chemistry and history courses to satisfy entrance requirements to the College of Education and Human Development. Consult your adviser.

Final Project

Students complete a senior thesis in Ast 4994—Directed Research (3 cr minimum). This requirement can be met with directed research in astronomy or a project more tailored to the specific track within the degree program. For example, students pursuing a career in secondary education may want to develop a unit on astronomy for junior high school instruction instead of an astronomy research project.

Astronomy Minor

Ast 1001—Exploring the Universe (4 cr)
or Ast 1011—Exploring the Universe (4 cr), Honors is recommended but not required
and Ast 2001—Introduction to Astrophysics (4 cr) and its prerequisites

Biblical Studies

Department of Classical and Near Eastern Studies

Minor Only

The academic study of the Bible is an extraordinarily broad interdisciplinary field. Research in this field can involve many disciplines including a number of ancient and modern languages, archaeology, history, various social sciences (including comparative religion), and literary studies. Biblical studies focuses on the Hebrew Bible and the New Testament in terms of their formation, cultural settings, and the history of their interpretation. This minor allows students who may not have the linguistic foundation to read the biblical texts in their original languages to pursue more advanced biblical studies.

Requirements

Students must complete a minimum of 15 upper division credits for the biblical studies minor. The minor focuses on study of the Hebrew scriptures and New Testament in translation or in the original languages. First-year Hebrew or Greek is required if you choose to study original texts in one of these languages.

All minors must take Clas 3072—New Testament and at least three courses from ANE 3501, 3502, 3503, 3504, Clas 3088, Clas 3089. One additional course must be taken from biblical survey and text seminars. The minor program must be approved by a biblical studies faculty member.

Biology

B.A.

For current information, see <www.umn.edu/commpub/c_cla/cla.html>.

Biology, Society, and Environment

B.A.

This program will be available in fall 2002. For a complete description and list of requirements, see <www.umn.edu/commpub/c_cla/cla.html>.

Chemistry

Department of Chemistry

B.A.

See the Institute of Technology section for the B.S.Chem. program.

Chemistry probes the fundamental concepts of nature and helps us understand the world around us. It deals with all substances at the molecular level: their composition, their properties, and how they are transformed into new substances. Chemistry is a central science of great importance to society. It provides a broad range of opportunities in many specialized fields, including biotechnology, polymer chemistry, environmental chemistry, materials chemistry, and medicine. After graduating with a bachelor's degree, many chemistry majors go on to graduate or professional schools to pursue advanced degrees. Other graduates find employment in industry, education, or government.

Degree Requirements

Students must complete at least 120 credits to graduate, including 36 credits in the major. The chemistry curriculum includes courses in chemistry, physics, mathematics, and the liberal arts. Specific degree requirements are listed under Required Courses.

Chemistry lecture/lab (32 cr)
Advanced chemistry lab elective (2 cr)
Directed research (2 cr)

Total credits in chemistry (36 cr)

Mathematics (12 cr)
Physics (8 cr)
Advanced technical electives (3 cr)
Introductory biology (4 cr)
Composition (4 cr)
Liberal education plus electives (53 cr)

Total credits for degree (120 cr)

All required courses must be taken A-F. A grade of C- or better is required in all technical courses. By selecting appropriate electives it is possible for a student to construct a program with emphasis in special interest areas, such as bioscience, chemical physics, education, environmental chemistry, and materials chemistry. Other special interest areas are also possible and chemistry advisers can be helpful in designing such programs. It is also possible for student to do dual degrees but this option requires careful course planning and should be discussed as early as possible with a chemistry adviser.

All chemistry majors are advised by faculty and staff in the chemistry advising office. Each student plans his or her degree program by submitting one-year plans in consultation with an adviser.

Required Courses

Biol xxxx—Biology, with lab that meets liberal education requirement (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2101—Introductory Analytical Chemistry Lecture (3 cr)
Chem 2111—Introductory Analytical Chemistry Lab (2 cr)
Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Lab (4 cr)
Chem 3501—Physical Chemistry I (3 cr)
Chem 3502—Physical Chemistry II (3 cr)
Chem 4701—Inorganic Chemistry (3 cr)
Chem 2094 or 4094—Directed Research (1-3 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1271—Calculus I (4 cr)
Math 1272—Calculus II (4 cr)
Math 2263—Multivariable Calculus (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Advanced chemistry lab elective (4 cr) from Chem 4111, 4311, 4511, 4711, 5223
Advanced technical elective (3-4 cr)

Chemistry Minor

Students take Chem 2301—Organic Chemistry I; Chem 2302—Organic Chemistry II; Chem 2311—Organic Lab (9-10 credits.)

In addition, students complete a minimum of 5 credits at 2xxx or higher in Chem lab or lecture courses.

Credits from seminars or special topics courses may not be applied toward the minor. A maximum of 2 credits of directed study may be applied toward the minor. All coursework must be taken A-F and grades of C- are required in the minor program courses. At least 5 credits (two courses) must be completed at the University of Minnesota, Twin Cities.

Chicano Studies

Department of Chicano Studies

B.A.

The program focuses on the social, historical, and cultural experience of the Mexican and Latino populations in the United States. The core courses introduce historical, literary, and cultural studies methodologies and perspectives on the European conquest and its aftermath; the place of Indians and African slaves in the new societies of the Caribbean, Mexico, Central and South America; and Mexican people in the United States after 1848. Courses in the curriculum examine the culture, literature, and history of Cuba, Puerto Rico, Central America, Mexico and the experiences of Chicana/os and Latina/os in the United States. The program allows flexibility in pursuing related work in Latin American studies, women's studies, and Spanish studies. Students are encouraged to develop interests in other disciplines in order to pursue double majors.

Degree Requirements

Students must complete at least 120 credits to graduate, including 32 credits in the major. All students take the two-semester core sequence, Chic 1105 and Chic 1106, in the first or second year. These courses offer a general introductory survey of major historical figures, geography, literature, and culture. Courses at 3xxx offer more focused opportunities to examine history, society, culture, literature, and gender. Students must also complete a senior paper.

Required Courses

Introductory Courses
Chic 1105—Introduction to Chicano Studies: The Beginnings to 1875
Chic 1106—Introduction to Chicano Studies: Mexico and the United States (1871-present)

Literature
Chic 3114—International Perspectives: U.S.-Mexico Border Cultures
Chic 3507—Introduction to Chicano Literature

History (choose three)
Chic 3427, 3428, 3441, 3442

Chicana-Latina (choose two)
Chic 3402, 3712, 3375

Senior Paper
Chic 5993—Directed Studies (minimum 3 credits)

Electives—Students may consult with the Chicano studies adviser and coordinate two or more courses in international studies, Latin American studies, Spanish studies, and/or women's studies.

Final Project

Students are encouraged to start thinking about the final project during the fall semester of their senior year or immediately after completing all the course requirements. Students should begin discussions with their adviser and begin a library search to compile a bibliographical collection supporting their topic. Students may engage in a bibliographical search through a 1-credit directed studies course (Chic 3993) and then follow up with a second directed studies course (Chic 5993).

Chicano Studies Minor

Chic 1105 or Chic 1106

Two courses in history from:
Chic 3427, 3428, 3441, 3442

One course in literature:
Chic 3507 or 3114

Two Chicana-Latina courses from:
Chic 3402, 3375, 3712

Child Psychology

Institute of Child Development

Child psychology deals with behavioral development from the prenatal period to maturity in the areas of cognition, ethology, genetics, language, learning, perception, and social behavior.

The Institute of Child Development, housed in the College of Education and Human Development, offers a bachelor of arts, a bachelor of science, and a minor in child psychology through the College of Liberal Arts. All undergraduate child psychology courses are considered CLA courses and they count toward the CLA graduation requirements.

More than 80 CLA faculty members have received awards for outstanding or distinguished teaching.

Both the B.A. and B.S. degrees prepare students for graduate study in psychology, education, medicine, law, sociology, and other behavioral sciences. In addition, with its combination of intensive training in developmental psychology and in-depth field experience, the B.S. prepares students for careers and additional training in such areas as early childhood education, counseling, and human service programs.

Students completing the degree program in child psychology may not receive a second degree from the Department of Psychology.

Child psychology degree candidates may not use course credits from psychology or educational psychology to count toward the required 18 3xxx, 4xxx, and 5xxx credits outside the major department.

Preparatory Coursework—Students take CPsy 2301—Introductory Child Psychology and Psy 1001—Introduction to Psychology to prepare for the major.

B.A.

Degree Requirements

Students must complete at least 120 credits to graduate, including two preparatory courses and 33 additional credits in the major. Major credits are distributed among core courses, a methods course, a senior project, and electives.

Required Courses

Methods Courses

CPsy 3308—Introduction to Research Methods

One of the following statistical methods courses: EPsy 3264, Soc 3811, Stat 3011

Core Courses

CPsy 4331—Social and Personality Development

CPsy 4343—Cognitive Development

Four elective courses (16 cr) in child psychology

Final Project

Students complete a senior project (CPsy 4347) that may include literature review or research.

B.S.

Degree Requirements

To complete the B.S. in child psychology, students must complete at least 120 credits, including two preparatory courses and 40-42 additional credits in the major. Major credits are distributed among core courses, a methods course, a senior project, and electives.

Required Courses

Methods Courses

CPsy 3308—Introduction to Research Methods

One of the following statistical methods courses: EPsy 3264, Psy 3801, Soc 3811, Stat 3011

One evaluation methods course: EPsy 5243—Principles and Methods of Evaluation or EPsy 5849—Observation and Assessment of the Preschool Child

Core Courses

CPsy 4311—Behavioral and Emotional Problems of Children

or CPsy 4313—Developmental Disabilities

CPsy 4329—Biological Foundations of Development

CPsy 4331—Social and Personality Development

CPsy 4334—Children, Youth in Society

CPsy 4343—Cognitive Development

CPsy 4994—Directed Research in Child Psychology

and/or CPsy 4996—Field Study in Child Psychology (4 cr total)

One CPsy elective (4 cr)

Final Project

Senior project CPsy 4347 (2 cr) (either literature review or research project) must be completed before graduation.

Child Psychology Minor

Required preparatory courses:

CPsy 2301—Introductory Child Psychology

and Psy 1001—Introduction to Psychology

To complete the minor:

CPsy 3308—Introduction to Research Methods

Two courses (8 cr) from:

CPsy 4329, 4331, 4343

One CPsy elective (4 cr)

Chinese

See Asian Languages and Literatures.

Classical and Near Eastern Archaeology

Department of Classical and Near Eastern Studies

B.A.

This major allows students to concentrate their studies on the material remains from the ancient civilizations of Greece, Rome, Egypt, and Biblical lands from ca. 3000 B.C. through A.D. 650. The program includes courses from the Departments of Classical and Near Eastern Studies, Anthropology, Art History, Geography, Geology, and History.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 36 credits in the major. Students must complete two years of Greek, Latin, or Hebrew (which also fulfills the CLA language requirement) and 12 approved courses in the major.

Required Courses

Clas 1043—Introduction to Greek/Roman Archaeology

or Clas 3008—History of Ancient Art (4 cr)

Clas 3152—Greek Art and Archaeology (4 cr)

Clas 3162—Roman Art and Archaeology (4 cr)

One course in ancient history (3 cr)

Eight courses (24 cr) from Groups 1-4 as follows:

At least five courses must be from Groups 1-3, with at least one course from each group. The remaining three courses may be selected from Groups 1-4. Other courses may be substituted for these last three, as approved by the director of undergraduate studies.

Group 1. The Classical World

Clas 5111—Prehistoric Art and Archaeology of Greece

Clas 5112—Archaic and Classical Greek Art

Clas 5103—Hellenistic and Early Roman Art and Archaeology

Clas 5108—Greek Architecture

Clas 5172—Roman Art in the Private Sphere

Clas 5182—Public Art in the Roman Empire

Group 2. The Near East

Clas 3142—Art of Egypt

Clas 3/5088—Archaeology in Biblical Lands I: Old Testament Period

Clas 3/5089—Archaeology in Biblical Lands II: New Testament Period

Anth 3011—Archaeology of the Ancient Near East

Group 3. Field/Lab Work*

Clas 3/5340—Practicum in Archaeological Field and Computer Techniques

Clas 5120—Field Research

Anth 4069—Environmental Archaeology

**Students with special needs that preclude participation in the field or laboratory may make other arrangements as approved by the director of undergraduate studies.*

Group 4. Related Subjects

Appropriate courses may be selected from ANE, Clas, Grk, Hebr, Hist, HSci, JwSt , and RelA. Course selections are subject to the approval of the director of undergraduate studies.

Classical and Near Eastern Archaeology Minor

Five courses, distributed as follows:

Clas 1043—Introduction to Greek/Roman Archaeology

or Clas 3008—History of Ancient Art (4 cr)

Four courses from Groups 1-4 above, distributed as follows:

At least one course each from Groups 1-3, with the remaining one course from Groups 1-4.

Classical Civilization

Department of Classical and Near Eastern Studies

B.A.

This interdisciplinary program encompasses the study of Greek and Roman cultures and their influence on Western civilization and encourages study of related or parallel cultures such as those of Islam and the Indian subcontinent. It provides a comprehensive alternative to more specialized majors that focus primarily on one aspect or subject matter of classical antiquity and the spheres of its influence, such as art, archaeology, history, philosophy, and literature, or a narrower span of historical periods. The program enables students to investigate classical civilization and its heritage from several perspectives and become acquainted with the methods and aims of several disciplines.

Preparatory Coursework—Prospective majors are advised to begin their language study as early as possible. Students wishing to declare a major in classical civilization must make an appointment with the director of undergraduate studies to outline distribution requirements and should bring a current transcript to this and all subsequent meetings with their adviser.

Degree Requirements

Students must complete at least 120 credits to graduate, satisfy the CLA language requirement in Greek or Latin, and earn at least 36 credits in the major in twelve approved courses, eight of them at or above 3xxx, including two courses with the ClCv designator and other courses offered by at least three different departments of those offering required courses. The nature and distribution of the required coursework make classical civilization a convenient as well as strong second major complementary to many other majors.

Required Courses

Language and literature (three courses, 9 cr)

Art, art history, archaeology (three courses, 9 cr)

Thought and religion (two courses, 6 cr)

Classical traditions (two courses, 6 cr)

Related electives (two to four courses, 6-12 cr)

A list of courses from other departments that satisfy major requirements can be found in the *Undergraduate Student Handbook*, available from the classical civilization program office.

Language Requirements

Majors are required to satisfy the CLA language requirement in either Greek or Latin.

Final Project

All majors are required to complete a senior project. The nature of the individual project will be defined by the student and his or her adviser. Majors may but are not required to register for (1-3) credits while working on the project.

Classical Civilization Minor

In addition to satisfying a language requirement (at least two courses in either the Greek or Latin language or demonstrated proficiency at an equivalent level and one course concerned with the culture of the country or countries where the chosen language was used), classical civilization minors must take four approved courses, including at least one course from each of the four areas required for the major. These courses should be chosen with the guidance of a faculty adviser.

Communication Studies

Department of Communication Studies

B.A.

The program examines human communication using both humanistic and social scientific methods. Fields of study include speechmaking, rhetorical criticism, ethics, interpersonal, small group, organizational, intercultural, and electronic (broadcasting, cable, satellite, Internet) forms of communication.

Students select courses from the Communication and Social Interaction Cluster and Communication and Culture Cluster.

Preparatory Coursework—Students seeking admission to the major must first meet with a communication studies adviser in 278 Ford Hall to declare a premajor. Students are strongly encouraged to declare their major during their first or second year.

Students must complete the following two courses to be admitted into the major:

Comm 1101—Introduction to Public Speaking

Comm 1313—Analysis of Argument

Degree Requirements

Students must complete 120 credits to graduate, including 36 credits in the major.

Students must complete at least 27 credits in 3xxx, 4xxx, or 5xxx courses selected from the two clusters that comprise the undergraduate curriculum. Students must take at least 15 credits from one cluster and at least 6 credits from the other.

A senior paper must also be completed in a 4xxx or 5xxx course designated as a senior paper course. The department's advising office has a list of eligible courses.

Required Courses

At least 27 credits in 3xxx, 4xxx, or 5xxx courses selected from the clusters below, including at least two 4xxx or 5xxx courses, two courses from Comm 3211, 3401, 3601, and 3 credits from Comm 3201, 3411, 3422, 3605, 3990, 4452

Communication and Social Interaction Cluster

Comm 3190, 3211, 3401, 3402, 3411, 3431, 3441, 3422, 4231, 4235, 4291, 5110, 5233, 5401, 5402, 5408, 5411, 5421, 5431, 5441, 5461, 5462

Communication and Culture Cluster

Comm 3190, 3201, 3404, 3405, 3406, 3451, 3452, 3601, 3602, 3605, 3615, 3625, 3631, 4452, 4602, 4615, 4616, 4621, 5210, 5220, 5261, 5404, 5406, 5451, 5452, 5611, 5617, 5618

Final Project

Students must complete a senior paper (see above) before graduation. For details about project requirements, contact the communication undergraduate advisers.

Through the JASON Project, the University's Bell Museum works directly with Titanic discoverer Dr. Robert Ballard on distance learning programs for young people.

Communication Studies Minor

Comm 1101—Introduction to Public Speaking

or Comm 1313—Analysis of Argument

Five courses selected from the two clusters, with at least three courses from one cluster, and one from the other cluster. One of the five courses must be at the 4xxx or 5xxx level, and two of the courses must be from the following core courses: Comm 3211, 3401, 3601.

Computer Science

Department of Computer Science and Engineering

B.A.

See the Institute of Technology section for the B.S.Comp.Sc. program.

Computer science is concerned with the study of the hardware, software, and theoretical aspects of high-speed computing devices and the application of these devices to a broad spectrum of scientific, technological, and business problems.

The curriculum gives students a basic understanding of computer science. After completing a required set of fundamental courses, students can arrange their subsequent work around one of several upper division emphases. These emphases allow concentrations within computer science. This should prepare a student for a variety of industrial, governmental, and business positions involving the use of computers, or for graduate work in the field.

Admission Requirements—Applicants must have a minimum cumulative GPA of 2.70 in University of Minnesota coursework and must have completed the required preparatory courses with a grade of C- or better in each course. However, if the GPA in the required preparatory courses is below 2.70, the department may deny admission to the major.

Math 1271—Calculus I

or Math 1371—Calculus: Concepts, Explorations, and Applications I

Math 1272—Calculus II

or Math 1372—Calculus: Concepts, Explorations, and Applications II

Math 2243—Differential Equations and Livear Algebra

CSci 1901—Structure of Computer Programming I

CSci 1902—Structure of Computer Programming II

CSci 2011—Discrete Structures of Computer Science

For details about current admission requirements, see the Department of Computer Science's *Undergraduate Guide.*

Degree Requirements

To complete the B.A., students must complete at least 120 credits. Students take three courses in mathematics and one statistics course. The major consists of 41 CSci credits, including eight required courses and an upper division emphasis. The purpose of this emphasis is to allow students to select a coherent program of courses specific to their interests. The upper division emphasis is any program that (1) forms a coherent academic program in an area of computer science; (2) consists of at least 9 credits of elective 4xxx or 5xxx CSci courses; (3) includes no more than 3 credits of CSci 4970 or 59xx courses. Finally, students must also complete a major project. All courses below must be taken A-F and passed with a C- or better.

Required Courses

CSci 2011—Discrete Structures of Computer Science

CSci 2021—Machine Architecture and Organization

CSci 4011—Formal Languages and Automata Theory

CSci 4041—Algorithms and Data Structures

CSci 4061—Introduction to Operating Systems

CSci 4081—Introduction to Software Engineering

Math 2243—Linear Algebra and Differential Equations

Stat 3021—Introduction to Probability and Statistics

Final Project

Students satisfy the major project requirement by taking CSci 4081.

Computer Science Minor

The minor consists of at least five 3- or 4-credit approved computer science courses of which three must be taken at the University with the CSci designator. At least one course must be 5xxx. All courses must be taken A-F and only courses completed with a grade of C- or better count toward the minor. Cumulative GPA for all University CSci courses must be at least 2.00; this includes CSci courses that are not used for the minor. Only computer science courses listed for the major are acceptable.

Cultural Studies and Comparative Literature

Department of Cultural Studies and Comparative Literature

B.A.

Courses in the Department of Cultural Studies and Comparative Literature (CSCL) pursue questions and ways of knowing that cross traditional disciplinary boundaries. Students study culture as a set of complex connections and interrelations: between texts and everyday life, ideas, and the material world, discourse and power. Students may choose between two tracks, each of which explores these overarching concerns with a specific emphasis:

The comparative literature track engages primarily verbal texts, "literature" in its broadest sense (novels, plays, poetry, prose, and expository writing of various kinds, such as philosophy and scientific discourse) and in a historical and global context.

The cultural studies track investigates practices in all available media, including the visual-spatial (painting, sculpture, architecture, the built environment, the soundscape) and combinations (film, TV, multimedia events, festivals, riots).

Note: The department also offers a major in studies in cinema and media culture. See page 194.

Degree Requirements

Students must complete at least 32 credits in the major. Students select either the comparative literature or cultural studies track and complete a minimum of ten courses for the major: two introductory (1xxx) courses plus seven at upper division levels. To allow for flexibility, the tenth course may be taken at any level. Requirements for the separate tracks are described below.

Required Courses

Cultural Studies Track

CSCL 1001—Introduction to Cultural Studies: Rhetoric, Power, Desire

or CSCL 1301—Reading Culture: Theory and Practice

and CSCL 1201—Introduction to Visual Cultures

or CSCL 1501—Reading History: Theory and Practice

or CSCL 1921—Introduction to Film Study

Five 3xxx courses, including a minimum of one each from three of the following four subdivisions: discursive practices and genres, subjectivity and history, ideologies and disciplines, critical theories and methods

Two 4xxx or 5xxx courses, including CSCL 4990—Senior Seminar and Workshop

One additional CSCL course

Comparative Literature Track

CSCL 1101—Introduction to Literary Cultures

or CSCL 1401—Reading Literature: Theory and Practice

and CSCL 1201—Introduction to Visual Cultures

or CSCL 1501—Reading History: Theory and Practice

or CSCL 1921—Introduction to Film Study

Five 3xxx courses, including a minimum of one each from three of the following four subdivisions: discursive practices and genres, subjectivity and history, ideologies and disciplines, and critical theories and methods.

Two 4xxx or 5xxx courses, including CSCL 4990—Senior Seminar and Workshop

One additional CSCL course

Note: CSCL, CSDS, CLit topics courses and independent/directed study courses may be used to meet stated 3xxx-5xxx requirements with adviser approval. Grades in the major must be C- or better.

Electives—Courses from other units may be substituted (on an ad hoc basis) for department major courses if approved by the student's adviser or the director of undergraduate studies.

Final Project

The senior project requirement may be satisfied by completing CSCL 4990 or through a directed study with a faculty adviser or by special registration in any 3xxx or 5xxx course.

Cultural Studies and Comparative Literature Minor

Students take one 1xxx course plus 14 additional credits at 3xxx, 4xxx, or 5xxx.

Note: A maximum of two 3xxx/5xxx classes may be topics courses and/or independent/directed study courses. All grades in CSCL must be C- or better.

Dance

Department of Theatre Arts and Dance

B.A.

The B.A. in dance emphasizes general dance studies. This degree prepares the student for further studies in such areas of dance as performance, choreography, dance history, criticism, ethnology, pedagogy, movement analysis, and kinesiology.

Admission Requirements—All entering dance students must first be accepted into CLA. Acceptance into the B.A. program is by audition only.

Degree Requirements

Students complete at least 45 credits in the major.

The 45 credits can be earned in the major areas of professional technical training, creative process, performance experience, dance history and studies, and career knowledge of the field. This requirement includes 12 credits of dance electives. Major coursework must be taken A-F, except Dnce 4901—Senior Seminar which is S-N only.

Required Courses

Dnce 1601—Dance Improvisation (3 cr)
Dnce 1626—Music for Dance (3 cr)
Dnce 3010—Modern Dance Technique 5 (2 cr)
Dnce 3020—Modern Dance Technique 6 (2 cr)
Dnce 3401—Dance History 1 (3 cr)
Dnce 3402—Dance History 2 (3 cr)
Dnce 3601—Dance Composition 1 (3 cr)
Dnce 3602—Dance Composition 2 (3 cr)
Dnce 3700 or 5700—Performance (2 cr each; 4 cr total required)
Dnce 3901—Topics in Dance: Survival Strategies in Dance (1 cr)
Dnce 4443—Philosophy and Aesthetics (3 cr)
Dnce 4601—Dance Composition 3 (3 cr)
Dnce 4901—Senior Seminar (2 cr)
Electives (18 cr total, no more than 6 cr in technique)

Electives—The elective requirement may be fulfilled by courses in dance, music, theatre, art history, kinesiology, cultural studies, speech communications, women's studies, as agreed upon between the student and dance adviser.

Final Project

Requirements for final projects are completed in the required course Dnce 4901—Senior Seminar.

B.F.A.

The B.F.A. in dance emphasizes technical, compositional, and performance training in modern dance. The program seeks to prepare the gifted student for a performance or creative career.

Admission Requirements—All entering dance students must first be accepted into CLA. Acceptance into the B.F.A. program is by audition only.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 78 credits in the major.

Major credits must be earned in areas of professional technical training, creative process, performance experience, dance history and studies, and career knowledge of the field. This requirement includes 18 credits of dance-related electives. Major coursework must be taken A-F, except Dnce 4901—Senior Seminar which is S-N only.

Required Courses

Dnce 1601—Dance Improvisation (3 cr)
Dnce 1626—Music for Dance (3 cr)
Dnce 3010—Modern Dance Technique 5 (2 cr)
Dnce 3020—Modern Dance Technique 6 (2 cr)
Dnce 3110—Ballet Technique 5 (2 cr)
Dnce 3120—Ballet Technique 6 (2 cr)
Dnce 3210—Jazz Technique 5 (1 cr)
Dnce 3220—Jazz Technique 6 (1 cr)
Dnce 3401—Dance History 1 (3 cr)
Dnce 3402—Dance History 2 (3 cr)
Dnce 3433—Articulate Body (3 cr)
Dnce 3601—Dance Composition 1 (3 cr)
Dnce 3602—Dance Composition 2 (3 cr)
Dnce 3621—Dance Production 1 (3 cr)
Dnce 3622—Dance Production 2 (3 cr)
Dnce 3700 or 5700—Performance (2 cr each; 8 cr required)
Dnce 4443—Philosophy and Aesthetics (3 cr)
Dnce 4601—Dance Composition 3 (3 cr)
Dnce 4602—Dance Composition 4 (3 cr)
Dnce 4901—Senior Seminar (2 cr)
Dnce 5010—Modern Dance Technique 7 (3 cr)
Dnce 5020—Modern Dance Technique 8 (3 cr)
Dnce 5601—Dance Composition 5 (3 cr)
Dnce 5858—Teaching Dance (4 cr)
Electives (12 cr total, no more than 3 cr in technique)

Electives—The dance-related academic elective requirement may be fulfilled by courses in such areas as music, theatre, art history, kinesiology, cultural studies, speech communications, and women's studies, as agreed upon between students and their dance advisers.

Final Project

Requirements for final projects are completed in the required course Dnce 4901—Senior Seminar.

Dutch Studies

Department of German, Scandinavian, and Dutch

Minor Only

The Department of German, Scandinavian, and Dutch offers courses in Dutch, the language spoken in the Netherlands and parts of Belgium. The Dutch studies minor includes study of the spoken language, literature, philology, culture, and civilization. The minor has been supported by an exchange with the University of Amsterdam. The minor program must be approved by the Dutch adviser

Requirements

A passing score on the graduation proficiency test in Dutch is a prerequisite for this minor. Students take Dtch 3011—Conversation and Composition and Dtch 3012—Conversation and Composition; 6 credits, selected in consultation with the adviser, from Dtch 3310, 3510, 3610, and 5490; and one additional, related 3xxx, 4xxx, or 5xxx course, selected in consultation with the adviser.

East Asian Studies

Institute for Global Studies

Minor Only

Students take four semesters of an East Asian language; EAS 3211—Geography of East Asia; EAS 3461—Introduction to East Asia I: The Imperial Age or EAS 3462—Introduction to East Asia in Modern Times 1600-2000; at least two 3xxx-5xxx courses in the humanities dealing with East Asia or a single East Asian society; and at least one 3xxx-5xxx course in the social sciences dealing with East Asia or a single East Asian society.

Economics

Department of Economics

The three economics majors emphasize critical thinking and the understanding of basic economic principles. The program offers three degrees: the B.A., the B.A.-quantitative emphasis, and the B.S. The B.A. gives students a solid background in economics, is the least quantitative of the three majors, and provides excellent preparation for students interested in working immediately after graduation or considering law school. The B.A.-quantitative emphasis adds basic quantitative training (in calculus, linear algebra, and econometrics) and best suits students considering graduate work in business administration. The B.S. is for students interested in graduate study in economics or in a career where quantitative economic analysis plays a significant role. The strong quantitative component in this degree emphasizes multivariate calculus, linear algebra, and econometrics.

Students choose from courses in comparative economic systems; economic theory; econometrics; economic development; game theory; industrial organization; cost-benefit analysis; environmental, financial, international, mathematical, monetary, public, and labor economics.

B.A.

Preparatory Coursework—Econ 1101—Principles of Microeconomics, Econ 1102—Principles of Macroeconomics, and Math 1271—Calculus I with a minimum grade of C- in each.

Degree Requirements

Students must complete at least 120 credits to graduate, including 28 economics credits. Students take Econ 1101 and 1102 and Math 1271 before declaring the major. In addition to taking economics courses, students can choose one upper division course from related programs, and can take one independent or directed study. Some courses from mathematics and statistics are required for the degree. Study of one country (out of Japanese Economy, Russian Economy, Latin American Economy, Chinese Economy, or any other area study) may count toward the major. Transfer students must complete at least nine of their upper division economics credits (3 courses) at the University of Minnesota, Twin Cities.

Required Courses

Econ 3101—Intermediate Microeconomics
Econ 3102—Intermediate Macroeconomics
Six upper division economics courses for a total of 18 credits.
Stat 3011—Introduction to Statistical Analysis
Stat 3022—Data Analysis

Electives—One course can be taken from the following selected courses in accounting, finance, and applied economics and applied to the 18 credits of economics upper division courses.

Fina 3001
Acct 5100
ApEc 4821 or selected 5xxx ApEc courses

Final Project

Students have four options for completing the senior project:

- A or B grade in an instructor-supervised research seminar (2 credits): Econ 3951—Major Project Seminar.
- Directed study (up to 3 credits of Econ 3993) resulting in a project supervised by a faculty member or instructor.
- A term paper with a minimum grade of A- from an upper division economics course to be approved by the senior project instructor
- Acceptable honors (up to 6 credits) projects or theses.

B.S.

Preparatory Coursework—Econ 1101—Principles of Microeconomics, Econ 1102—Principles of Macroeconomics, Math 1271—Calculus I, and Math 1272—Calculus II. A minimum grade of C- in each course is required.

Degree Requirements

To complete the B.S., students must complete at least 120 credits, including 30 economics credits. Students take Econ 1101 and 1102 and Math 1271 and 1272 before declaring the major. In addition to taking economics courses, students can choose one upper division course from related programs, and can take one independent or a directed study. Four upper division courses from mathematics and statistics are required for the degree. Only one country study (out of Japanese Economy, Russian Economy, Latin American Economy, Chinese Economy, or any other area study) may count toward the major. Transfer students must complete at least seventeen of their upper division economics credits (three upper division and two honors courses) at the University of Minnesota, Twin Cities.

Required Courses

Econ 3101—Intermediate Microeconomics
Econ 3102—Intermediate Macroeconomics
Econ 4261—Econometric Analysis
Two Econ honors courses (8 credits)
Four additional upper division Econ courses for a total of 12 credits.

Math 2243—Linear Algebra and Differential Equations
Math 2263—Multivariable Calculus
Stat 4101—Theory of Statistics I
Stat 4102—Theory of Statistics II (Stat 5101 and 5102 recommended)

Electives—One course may be taken from the following courses in accounting, applied economics, finance, and math and applied to the 12 credits of economics upper division courses.

Acct 5100
ApEc 4821 or selected 5xxx ApEc courses
Fina 3001
Math 4065, 4606, 5615-5616

B.A.-Quantitative Emphasis

Preparatory Coursework—Econ 1101—Principles of Microeconomics, Econ 1102—Principles of Macroeconomics, Math 1271—Calculus I, and Math 1272—Calculus II with a minimum grade of C- in each course.

Degree Requirements

To complete the B.A.-quantitative emphasis, students must complete at least 120 credits, including 26 economics credits. Students take Econ 1101 and 1102 and Math 1271 and 1272 before declaring the major. In addition to taking economics courses, students can select one upper division course from related programs and one independent or directed study. Three mathematics and statistics courses are required for the degree. Only one country study (out of Japanese Economy, Russian Economy, Latin American Economy, Chinese Economy, or any other area study) may count toward the major. Transfer students must complete at least nine of their upper division economics credits (three courses) at the University of Minnesota, Twin Cities.

Required Courses

Econ 3101—Intermediate Microeconomics
Econ 3102—Intermediate Macroeconomics
Econ 4211—Principles of Econometrics
Four additional upper division economics courses for a total of 12 credits
Math 2243—Linear Algebra and Differential Equations
Stat 3021—Introduction to Probability and Statistics
Stat 3022—Data Analysis

Electives—One course may be taken from the following selected courses in accounting, finance, and applied economics and applied to the 12 credits of economics upper division courses.

Fina 3001
Acct 5100
ApEc 4821 or selected 5xxx ApEc courses

Final Project

Students have four options for completing the senior project.

- A or B grade in an instructor-supervised research seminar (2 credits) offered every fall and spring semesters: Econ 3951—Major Project Seminar.
- Directed study (up to 3 credits of Econ 3993) resulting in a project supervised by a faculty member or instructor.
- A term paper with a minimum grade of A- from an upper division economics course to be approved by the senior project instructor
- Acceptable honors (up to 6 credits) projects or theses.

Economics Minors

Economics is a useful minor for students who have a related major in finance, management, statistics, mathematics, geography, sociology, political science, history, urban studies, international relations. Minors are available in six subfields designed to complement study in other majors. Each minor requires at least 13 credits (a minimum of four courses) of upper division work in economics.

Required Preparatory Courses (for all minors)
Econ 1101—Principles of Microeconomics (or equiv)
Econ 1102—Principles of Macroeconomics (or equiv)

General Economics Minor
Math 1142—Short Calculus or Math 1271—Calculus I (or equiv)
Econ 3101—Intermediate Microeconomics
or Econ 3105—Managerial Economics
Nine additional credits of upper division (at least three 3xxx-4xxx) courses in economics
Up to 3 credits of directed study (Econ 3993 or 4993) may be counted toward the general economics minor.

Economic Theory Minor
Math 1271-1272—Calculus I-II (or equiv)
Math 2243—Linear Algebra and Differential Equations
and Math 2263—Multivariable Calculus (or equiv)
Econ 3101—Intermediate Microeconomics
and Econ 3102—Intermediate Macroeconomics
One course from the following list: Econ 4107H, 4113, 4731, 4741

Econometrics Minor
Math 1271—Calculus I (or equiv)
Math 2243—Linear Algebra and Differential Equations (or equiv)
Stat 4101-4102—Theory of Statistics I-II
or Stat 5101-5102—Theory of Statistics I-II
Econ 3101—Intermediate Microeconomics
and Econ 3102—Intermediate Macroeconomics (or equiv)
Econ 4261—Econometric Analysis
Three credits of directed study (Econ 4993) for an econometrics research project

International Trade and Development Minor
Math 1271—Calculus I (or equiv)
Econ 3101—Intermediate Microeconomics (or equiv)
Econ 4301—Economic Development
or Econ 4331—Economic Development
Econ 4307—Comparative Economic Systems
or Econ 4337—Comparative Economic Systems
Econ 4431—International Trade
and Econ 4432—International Finance
or Econ 4401—International Economics

One from:
Econ 4313—The Russian Economy
or Econ 4315—Japanese Economy
or Econ 3960—Topics in Economics: The Chinese Economy
or Econ 4311—Economy of Latin America

Applied Microeconomics Minor
Math 1271—Calculus I (or equiv)
Econ 3101—Intermediate Microeconomics (or equiv)
Econ 3501—Labor Economics
or Econ 4531—Labor Economics
Econ 3601—Industrial Organization and Antitrust Policy
or Econ 4631—Industrial Organization and Antitrust Policy
Econ 4611H—Honors Course: Environmental Valuation
or Econ 4623—Housing Markets and Public Policy
Econ 3801 or 4821 or 4831
Recommended: Econ 4211—Principles of Econometrics

Based on a survey taken every 10 years, the economics program ranked #10 nationwide in the National Research Council's 1995 report.

Monetary Economics Minor

Math 1142—Short Calculus
or Math 1271—Calculus I (or equiv)
Stat 3011—Introduction to Statistical Analysis I (or equiv)
Econ 3101—Intermediate Microeconomics
and Econ 3102—Intermediate Macroeconomics
Econ 4751—Financial Economics
Econ 3701—Money and Banking
or Econ 4721—Money and Banking
Econ 4731—Macro Policy
or Econ 4741—Business Cycles

English

Department of English Language and Literature

B.A.

This major provides an opportunity to study human communication and artistic expression through literature, language, writing, and theory.

Courses challenge students to develop abilities in text analysis, critical thinking, problem solving, writing, and speaking—all highly valued skills in the contemporary world. Foundation courses provide majors with a shared vocabulary and a knowledge of literary history and analysis. Elective courses invite students to examine many literatures (EngL), understand the many varieties, settings, and uses of English language and writing (EngL and EngC), and develop their own talents as creative writers (EngW). Some students elect to include English studies in their interdisciplinary programs.

Preparatory Coursework—Prospective majors are encouraged to complete an introductory course in literature, creative writing, and/or English language before officially declaring the major. Suggestions include EngL 1001-1701, and EngW 1101-1104. To declare a major, a student schedules an appointment with the Undergraduate Studies Office (225 Lind Hall; 612-625-4592; englmaj@umn.edu), and completes a Major Program form which is filed in CLA, the department, and with the student.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 35 credits in the major (32 credits from 3xxx or higher courses). Credits are distributed among textual interpretation, historical surveys of literature, Shakespeare, English language or theory, elective courses, a seminar or writing workshop, and a senior paper. All English major courses must be taken A-F and completed with grades of C- or better.

Required Courses

Students take 10 courses (35 cr minimum) in EngL, EngW, or EngC (beyond the freshman writing requirements), including at least nine 3xxx courses, distributed as follows:

Foundation Courses

EngL 3001—Textual Interpretation, Analysis, and Investigation
Three of the following British and American literature survey courses: EngL 3003, 3004, 3005, 3006
EngL 3007—Shakespeare
or 3xxx Shakespeare in London course (department approved)
One of the following literary theory or English language courses: EngL 3002, 3601, 3602, 3603, 3605, 3606, 3611, 3612, 3613, 3621, 3632, 3633, 3641; EngC 3650 (topics in rhetoric/writing/language)

Electives

Three courses (minimum 9 cr), to include at least two 3xxx courses (6 cr) and one 1xxx or 3xxx course (3-4 cr).

Final Project

Each student produces a senior paper in EngL or EngW 3906W (4 cr), subject to department guidelines and faculty written approval. Honors *summa cum laude* degree candidates must also register for EngL 3883—Honors Thesis (3 cr).

English Minor

Students take EngL 3001—Textual Interpretation, EngL 3007—Shakespeare, two historical survey courses, and one 3xxx elective for a minimum of 18 credits.

European Area Studies

Institute for Global Studies

Minor Only

Students must complete the CLA second language requirement in a European language and take five courses (at least 15 credits) of 3xxx-5xxx coursework focusing on a particular topic in European area studies (excluding language courses). Courses must include Geog 3161—Geography of Europe, Hist 3707—Social and Economic History of Modern Europe, and 6 credits of humanities.

A maximum of 3 credits may be in directed studies or directed research and courses must be from a minimum of three different departments. All courses must be taken A-F with a grade of C- or better. The minor program must be approved by the area studies adviser.

Film Studies

See Studies in Cinema and Media Culture.

Foreign Studies

Minor Only

The foreign studies minor helps students integrate their study abroad with supporting University coursework from a variety of disciplines. Since some of the required courses *must* be taken before departure, careful advance planning is essential. A more detailed explanation of requirements, guidance concerning course selection, and minor application forms are available from the academic advisers in the Global Campus office, 230 Heller Hall (612-626-9000, e-mail UMabroad@umn.edu, Web <www.UMabroad.umn.edu>).

Requirements

In addition to required courses taken on campus (listed below), the foreign studies minor requires a minimum of eight weeks of study for academic credit in a foreign country. These credits must be accepted by the Office of Admissions as transfer credits.

Comm 3451—Intercultural Communication: Theory and Practice (before departure)
Comm 3452—Communication and the Intercultural Reentry (after return)
Six credits of 3xxx, 4xxx, or 5xxx courses focusing on the country or region of study.

Two years (four semesters) in a second language appropriate to the country of study, of which at least one year must be completed before departure. Students intending to study in an English-speaking country may use any language and/or, with Global Campus adviser approval, may substitute additional country-specific coursework for part or all of the language requirement.

French Studies

Department of French and Italian

B.A.

The French studies major includes courses in three areas in which students may concentrate: linguistics, literature, and culture. Courses in language and linguistics include history of the French language, structure of the language, sociolinguistics,

phonetics, conversation, and business French. Courses in literature and culture focus on topics and problems in three broad historical periods: the Middle Ages and Renaissance, early modern France, and modern and contemporary France. A number of courses focus on Francophone literature from Africa, the Caribbean, and Quebec. Courses in French cinema are also offered.

Many students combine a French studies major with another major, or choose to minor in French studies. The department offers selected courses in English for students who have not mastered French but want to study France and the French-speaking world.

Preparatory Coursework—Students take Fren 1001-1002—Beginning French and Fren 1003-1004—Intermediate French or equivalent courses.

Degree Requirements

Students must complete at least 120 credits to graduate, including 35 credits in the major. To ensure that all majors possess an adequate knowledge of the French language, they must complete the equivalent of six semesters of language instruction. Two of these are 3xxx courses that focus on intensive grammar review, development of writing skills, vocabulary building, and translation. A phonetics course, a civilization course, and an introduction to literature course (a prerequisite for all other literature courses) make up the rest of the core. A linguistics course (offered outside the department), serves as the prerequisite to most French linguistic courses. Through four electives, students may select courses from the entire range of offerings in literature, culture, and linguistics at 3xxx and 5xxx. All students complete a final written project in Fren 4101—Seminar in French Studies.

Required Courses

Fren 3014—French Phonetics
Fren 3015—Advanced French Grammar and Communication
Fren 3016—Advanced French Composition and Communication
Fren 3101—Introduction to French Literature
One civilization course (Fren 36xx)
One additional literature course (Fren 31xx-34xx)
Four electives

Note: Ling 3001—Introduction to Linguistics is a prerequisite for most French linguistics courses.

Final Project

Students complete a lengthy research paper in Fren 4101—Seminar in French Studies. The course focuses on contemporary issues in French studies.

French Studies Minor

Students complete prerequisites Fren 1001-1002—Beginning French and Fren 1003-1004—Intermediate French. In addition they complete a minimum of 17 additional credits, including Fren 3101—Introduction to Literature, Fren 3015—Advanced French Grammar and Communication, Fren 3016—Advanced French Composition and Communication, one civilization course (36xx), and one elective.

French and Italian Studies

Department of French and Italian

B.A.

The French and Italian studies major allows students interested in both cultures and languages to pursue a combined major. Students study specific works in each national literature while also exploring the interrelations and cross-cultural exchanges that have contributed to Italian and French literature and culture. This comparative perspective introduces students to a broad range of issues and cultural practices.

Preparatory Coursework—Students must take French 1001-1002—Beginning French, Fren 1003-1004—Intermediate French, or equivalent and Ital 1001-1002—Beginning Italian, Ital 1003-1004, or equivalent.

Degree Requirements

Students must complete at least 120 credits to graduate, including 36 credits in the major. Students complete the following in each language: two years of beginning language sequences, a conversation and composition course, an introductory literature course, and two elective courses. In addition, students select two French and Italian (FrIt) courses, excluding FrIt 5999, and complete their senior project in the French senior seminar or an appropriate Italian course.

Required Courses

Language

Fren 3015—Advanced Grammar and Communication
Ital 3015—Reading, Conversation, and Composition

Literature and Culture

Fren 3101—Introduction to French Literature
Ital 3201—Reading Italian Texts: Poetics, Rhetoric, Theory
Two Fren 3xxx or 5xxx literature, linguistics, or culture courses
Two Ital 3xxx or 5xxx literature or culture courses
Two FrIt courses

Final Project

The senior project is completed in Fren 4101—Seminar in French Studies or in an appropriate Italian course.

Geography

Department of Geography

Geography is an academic and practical field that studies the manner in which human-made places and natural systems interact and change. Geographers study these interactions at all scales: neighborhoods and cities; regions and nations; single or multiple biophysical systems, and even the world as a whole. Geography attempts to explain not only these interactions and changes, but in many instances how they are perceived and what meanings they hold. Depending on their specific interests, geographers will employ one or more of a variety of methods and techniques: fieldwork, mapping, conventional narrative, ethnography, spatial statistics and modeling, and textual analysis. Many geographers are also interested in the intersections of science, technology, and information, such as the impact of GIS on decision making. Geography's integrative perspective on regional and global change provides students with unparalleled understanding of today's complex world.

The B.A. provides students with a broad background in the discipline with emphasis on one of four tracks: city systems; regional analysis and development; environmental systems; and geographic information science.

The B.S. offers a solid foundation in the science of geography in either the environmental systems or geographic information, analysis, and representation track.

The city systems track examines urban phenomena on two scales. In cities as systems, students learn about the internal structure of cities, including their morphology, land-use patterns, social geography, and meaning. In

The National Research Council ranked the geography program #3 in the nation.

systems of cities, the interconnections among cities at regional, national, and global scales are emphasized. The track examines cities and city systems in diverse settings—North American cities, European cities, cities in the developing world—and from different perspectives—historical, social, political, economic, and other approaches.

In the regional analysis and development track, students learn to think critically about different ways of life and livelihood strategies, as well as different conceptions and practices of development in different geographic contexts. They also learn about the connectedness of societal and environmental processes from the local scale to the global.

The environmental systems track examines the natural environments and resources that sustain human life and activity. Students explore the local and global patterns of climate, soils, vegetation, and surface land form; changes over time, both naturally occurring and caused by humans, in the natural environment; and ways of analyzing and predicting both human-caused and naturally occurring environmental change.

The geographic information science track is concerned with all aspects of geographical information, including collection, storage, manipulation, analysis, and visualization. This track encompasses geographical information science (GIS), cartography, remote sensing, spatial analysis, and numerical modeling. The track is also concerned with the relationship between geographic information science, systems, and society.

B.A.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 32 credits in the major with a grade of C- or better. Students take three core courses, a modes of geographic inquiry course, and five courses from the major track. A list of applicable courses is available from the undergraduate adviser in the Department of Geography. Students also complete a senior project.

Required Courses

Core courses: Geog 1301—Introduction to Human Geography
or Geog 3001—Geographic Inquiry and Human Development
and two of the following: Geog 3371W/3371V—Introduction to Urban Geography, Geog 3401W/3401V—Geography of Environmental Systems, Geog 3561—Principles of Geographic Information Science
Geog 4001—Modes of Geographic Inquiry
or Geog 4002W—Social Theory and the Environment

Final Project

Students complete a senior project either in Geog 3985—Senior Project Seminar or by extra-credit registration in any course in the major track.

B.S.

Degree Requirements

To complete the B.S. in geography, students must complete at least 120 credits, including at least 38 credits in the major with a grade of C- or better. These credits include: three core courses; a modes of geographic inquiry course; and four or five courses in either the geographic information science track or the environmental systems track. A list of applicable courses is available from the undergraduate adviser in the Department of Geography. Students also complete a senior project.

Required Courses

Core courses: Geog 3401V or Geog 3401W—Geography of Environmental Systems
and Geog 3561—Principles of Geographic Information Science
and one of the following: Geog 1301W/1301V—Introduction to Human Geography, Geog 3001—Geographic Inquiry and Human Development, Geog 3371W/3371V—Introduction to Urban Geography
Geog 4001—Modes of Geographic Enquiry
or Geog 4002W—Social Theory and the Environment
Mathematics through Math 1272 or through Math 1372; or statistics through Stat 3022; or computer science (CSci 1107 and CSci 1113).

Final Project

Students complete a senior project either in Geog 3985—Senior Project Seminar or by extra-credit registration in any course in the major track.

Geography Minor

Students complete a minimum of 14 credits in 3xxx, 4xxx, or 5xxx courses with a grade of at least C-.

Geology

Department of Geology and Geophysics

B.A.

See the Institute of Technology section for the B.S.Geol. program.

Geology is the study of the composition, structure, and history of the Earth and of the processes that operate on and within it, with emphasis on the crust, oceans, and atmosphere. The B.A. prepares students for graduate study or professional employment.

Geologists are employed in a wide range of fields, including exploration for and development of natural resources (hydrocarbons, minerals, groundwater), environmental science, urban planning, education, oceanography, and other areas related to natural science. Potential employers include the oil, gas, and minerals industries, environmental consultants, federal and private research institutions, universities, schools, and government agencies. An advanced degree is usually required for a career in research or teaching.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 41 credits in the major. The program is built around a core of basic Earth science courses that are mainly taken in the sophomore and junior years. The curriculum provides a strong foundation in mathematics, physics, and chemistry. Some students select a geology major in part to obtain this broad science base. Students must pass all core courses with a grade of C- or better.

Required Courses

Geo 2201—Geodynamics I: The Solid Earth
Geo 2301—Mineralogy
Geo 2302—Petrology
Geo 2303—Geochemical Principles
Geo 3202—Geodynamics II: The Fluid Earth
Geo 3401—Geochronology and Earth History
Geo 3911—Introductory Field Geology
Geo 4501—Structural Geology
Geo 4602—Sedimentology and Stratigraphy
Geo 4631—Earth Systems: Geosphere/Biosphere Interactions
Two courses from: Geo 3870, 3880, 3890
One course from: Geo 4911, 4921, 4971
4 elective credits in geology
Math 1271-1272 or 1371-1372 or 1571-1572
Phys 1301-1302
Chem 1021-1022

Geology Minor

Students take Geo 1001—The Dynamic Earth: An Introduction to Geology or equivalent and 14 credits of geology or geophysics taken at 2xxx or above.

Environmental Geosciences Minor

Students take at least one of the following preparatory courses: Geo 1001, 1002, 1004, 1011, GC 1171, GC 1172. In addition, students choose a minimum of 14 credits of 3xxx courses from: Geo 3001, 3002, 3003, 3004, 3005, 3006. Appropriate higher level courses such as Geo 4701, Geo 4631, or Geo 5701 can be substituted with approval from the undergraduate adviser. The undergraduate adviser may also approve courses from other departments (e.g., Anth 3041, Econ 3611, Geog 5441, Soc 4305). Students must complete one of the following: Geo 1001, 1002, 1004, 3001.

German Studies

Department of German, Scandinavian, and Dutch

B.A.

The German studies program teaches and conducts research in the language, literature, and culture of the German-speaking nations of Europe: Germany, Austria, and Switzerland. The program also offers courses in Dutch, the language spoken in the Netherlands and parts of Belgium. The major in German Studies and minors in German and in Dutch studies include the study of the respective spoken language, as well as of literature, philology, culture, and civilization.

The department recommends study abroad in a German-speaking country for at least six months in order to acquire cultural familiarity and language fluency. Students may apply appropriate coursework to a German studies major or a German minor. The University is affiliated with exchange programs in Berlin and Freiburg for both one- and two-semester stays. There are also other possibilities for study at many additional German, Austrian, and Swiss universities. For more information on study abroad opportunities, see International Programs in the general information area of the CLA section.

Preparatory Coursework—The Graduation Proficiency Test in German. Students may declare the major at any time during the preparatory coursework.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 35 credits in the major. This includes a core curriculum of 20-24 credits (5-6 courses) and an additional 12-15 credits of electives (4-5 courses) selected according to the guidelines of the two emphases: literature, culture, and society; and linguistics and philology. Students in the first emphasis may take one of these electives in a program outside of German—such as art history, history, political science, philosophy, or international relations—if the course examines German-speaking areas. For students in the linguistics and philology emphasis, one of the electives must be taken in the linguistics program. The major program must be approved by the director of undergraduate studies.

Placement: The standard first-year classroom sequence consists of Ger 1001 and 1002. To enroll for second-year courses, CLA students must pass 1002 or the Entrance Proficiency Test. Consult the department for more information on placement and testing.

Required Courses

Core required of all students (5-6 courses)

Ger 3011-3012—Conversation and Composition (3012 may be skipped if an A is earned in 3011)

Ger 3104—Reading and Analysis of German Literature

Ger 3511-3512—German Culture and Civilization

One of the following sequences:

Literature, Culture, and Society Emphasis

Three to four more courses in literature, film , or social/cultural history. An advanced language course (30xx beyond 3012 or 50xx) may be substituted for one of these.

One elective within the German studies program or outside, if the course examines German-speaking areas (subject to the approval of the director of undergraduate studies).

In this emphasis up to two courses may be taken in translation if extra work in German is done by the student, as directed by the instructors of the courses or by the director of undergraduate studies.

Linguistics and Philology Emphasis

Three to four more courses in German linguistics and philology: Ger 37xx courses and Ger 5101—Analysis of German

One linguistics course chosen from Ling 3001, 3011, 3601, 5001, or 5601

Courses taken S-N may not be counted toward the major.

Final Project

Students complete GSD 3451—Major Project Seminar.

German Minor

Students take five courses (minimum of 17 credits), including Ger 3011-3012—Conversation and Composition (3012 may be skipped if an A is earned in 3011) (4-8 credits); Ger 3104—Introduction to Literary Analysis (4 credits); and two to three more 3xxx, 4xxx, or 5xxx courses (6-9 credits).

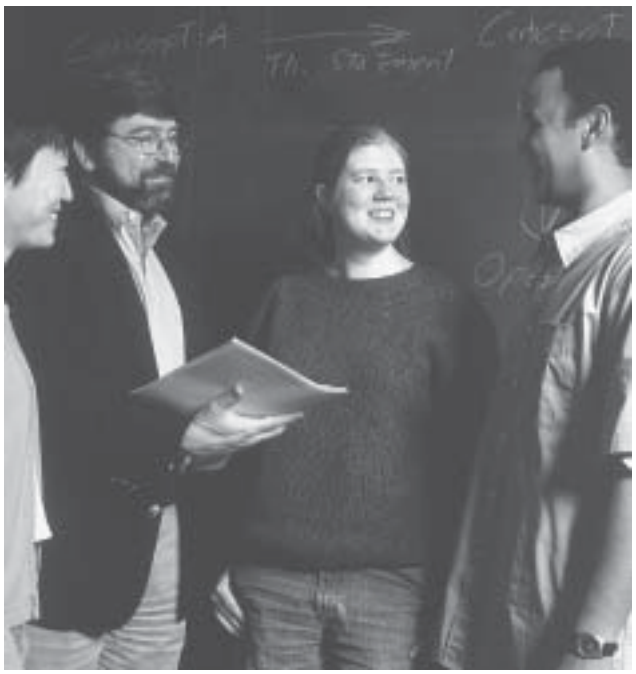
Global Studies

Institute for Global Studies

B.A.

This program offers students the opportunity to study the interrelated processes shaping today's increasingly interdependent world. Students examine political, economic, cultural, and social processes of local communities, nation states, transnational businesses, and social movements across the globe. The program requires students to integrate theoretical knowledge about broad global processes with regionally focused detailed

The German program is ranked 11th in the nation according to the National Research Council.



knowledge of social and cultural systems and language. Students complete a common set of core courses providing a broad overview of issues and approaches to global studies. Each student then chooses a thematic and regional concentration. Coursework is completed by selecting from relevant courses offered by a broad range of departments.

Preparatory Coursework—As preparation for the major, students are encouraged to take at least two of the following courses: Geog 1301, Hist 1012/1018, GloS 1015/1016; Pol 1025; CSCL 1001, CSCL 1301; and one year of foreign language study at the college level. Students must formally enroll in the major at the advising office, 232 Social Sciences Building. Students must meet with an adviser to develop a program that meets major guidelines.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 33 credits in the major. All courses for the major must be taken A-F and completed with a grade of C- or better. Students must declare a thematic and regional concentration. A minimum of 12 credits is required for each concentration. At least two of the courses taken within the thematic or regional concentrations must have the global studies (GloS) designator. Detailed information on courses fulfilling the requirements for specific concentrations is available in the *Global Studies Handbook.* Because the global studies major offers students an unusual level of flexibility, putting together a course of study that meets these requirements can be complex. Students must work closely with a global studies adviser in room 232 Social Sciences Building.

Required Courses

GloS 3101—Theoretical Approaches to Global Studies (4 cr)

GloS 3144—Knowledge and Power in Global Studies (4 cr)

Ways of Knowing requirement—3-4 credits

Students complete a breadth course of at least three credits appropriate to their thematic concentration in consultation with a global studies adviser.

Thematic Concentrations—12-13 credits

Students choose a thematic concentration from the options below. Within each thematic concentration students choose appropriate courses in consultation with a global studies adviser.

Culture, Power, Place: Coursework integrates humanities and social science perspectives on such phenomena as globalization, transnationalism, modernity, colonialism, nations and nationalism, ethnicity, and diasporic identities, by focusing on the ways that these produce and are produced by cultural forms. Students consider the political nature of cultural processes and the interrelated constitution of culture, power, and place.

Environment and Sustainable Development: Coursework examines how the global dynamics of capitalism determine forms of raw material extraction and natural resource use, and shape trajectories of environmental change; how development and macroeconomic programs affect people, societies and ecosystems across the world; and how grassroots and transnational social movements may articulate new visions of sustainable development, nature, and justice.

Governance, Peace and Justice in a Global Context: Coursework addresses interstate relations as well as the ways in which such relations have been altered by the increasing role of nongovernmental organizations, supranational organizations, and institutions of global governance. Students examine mechanisms promoting conflict resolution and cooperation in a global context.

International Political Economy: Coursework focuses on the study of economic relationships among governments, enterprises, societal groups, and communities from different countries. Students explore economic processes, the institutions that shape them, and local reaction to them.

Population, Migration, and Identity: Coursework provides students with a better understanding of human population development, transnational migration, and the politics of identity in an increasingly interdependent world. Students investigate population growth, fertility, mortality and transnational labor and refugee migration in different parts of the world.

Regional Concentrations—12-13 credits

Students choose a regional concentration from: Africa, East Asia, Europe, Latin America, Russia, or South Asia. Within each regional concentration students choose appropriate courses in consultation with a global studies adviser.

Language Requirements

Students complete at least two years of coursework in a language related to their regional concentration.

Additional Requirement

Students participate in a relevant experiential learning opportunity through study abroad, the foreign language immersion program, an internship, or a service learning experience. Work completed in meeting these requirements may count towards the thematic or regional concentrations where appropriate

Final Project

Students complete a senior project integrating their thematic and regional concentrations.

Global Studies Minor

Students complete 17 credits for the global studies minor. All courses must be taken A-F and completed with a grade of C- or better. All students complete GloS 3101 and GloS 3144 to fulfill the core requirements. Students then declare a thematic and regional concentration and complete an additional nine credits, including at least one breadth requirement, at least one course in a theme, and at least one course in a region.

Greek

Department of Classical and Near Eastern Studies

B.A.

Greek is the Western language with the longest continuous history, from the poetry of Homer composed in the first millennium B.C. to the present. This program focuses on literature, philosophy, religion, history, archaeology, and art associated with the Greek language from its earliest appearance through the golden age of the Greek city-state in the 5th century B.C. and the Roman Empire into the medieval Byzantine Empire. Greek majors who intend to continue in Classics graduate studies are strongly advised to study Latin as well.

Preparatory Coursework—Students take either Grk 1002 or 1111/1112 or 3111/3112 or must have four years high school Greek and one course from: Clas 1001, 1002, 1003, 1023, 1024, 3023, 3024.

Degree Requirements

Students must complete at least 120 credits to graduate, including 30 credits in the major. The major in Greek includes the reading of Greek authors and the study of ancient civilization from the broad range of courses offered at the University. The Greek authors include poets like Homer, philosophers like Plato and Aristotle, the playwrights who wrote the first comedies and tragedies, and Herodotus “the father of history.” The study of ancient civilization may include courses in Modern Greek, Latin, and other ancient languages, but at least one course must be concerned with ancient culture. Students also complete a senior project.

Required Courses

Upper Division Requirements

14 credits in Greek courses at 3113 or above

12 credits of related coursework: at least one course in ancient culture above 3xxx; additional Latin or Greek courses at 3113 or above, any classics courses above 3xxx, or other courses (e.g., ancient history, art) with approval of the director of undergraduate studies.

4 credits of a senior project (not required if this is the second major of a Latin-and-Greek double major)

Final Project

A senior project is required; double majors in Latin and Greek are required to complete only one senior project. The project usually takes the form of a paper, but other forms of a project may be considered.

Greek Minor

The Greek minor permits students who have satisfied the language requirement in Greek to read ancient authors and to expand their knowledge of ancient civilization.

Students must have taken either Greek 1002 or 1111/1112 or 3111/3112 or must have four years high school Greek and one course from: Clas 1001, 1002, 1003, 1023, 1024, 3023, 3024.

Upper division requirements: 11 credits in Greek courses at 3113 or above and 3 credits of related coursework at 3xxx level or higher, including courses in Latin, Greek, other ancient languages; classics courses; and other courses in ancient culture.

Hebrew

Department of Classical and Near Eastern Studies

B.A.

This program enables students to study the various periods of the Hebrew language covering a span of 3,000 years, from biblical times to the present. The program gives students the tools for work in the fields of literature, social sciences, religious studies, linguistics, and law. Hebrew equips the student for cross-disciplinary learning in several fields—ancient, medieval, and contemporary. Related areas include Jewish studies, religious studies, Arabic, Greek, and the extinct languages of the ancient Near East. Students are encouraged to incorporate study in Israel in one of the many exchange programs involving archaeology, the social sciences, or the humanities (consult the Global Campus office for more information).

Hebrew majors often use their major to complement a second major in another field such as political science, sociology, journalism, history, religious studies, business, speech communications, and linguistics.

For related coursework, see listings under ancient Near Eastern studies and Jewish studies.

Preparatory Coursework—Students take Hebr 3012 or equivalent.

Degree Requirements

Students must complete at least 120 credits to graduate, including 32 credits in the major. All students complete two semesters of advanced Hebrew. Then they must choose 6 credits of coursework from each of three areas: biblical studies, rabbinic and medieval texts, and modern Hebrew prose and poetry. In addition, students must take 6 credits of electives (taught in either Hebrew or English) and a linguistics course. The senior project completes the requirements.

Required Courses

Upper Division Requirements

Ling 3001—Introduction to Linguistics

Hebr 3015-3016—Advanced Modern Hebrew I-II

From the areas of biblical Hebrew, rabbinic/medieval Hebrew, and modern Hebrew, students must take a minimum of 6 credits in each area (minimum of 18 credits total):

Biblical Hebrew

Hebr 3201-3202—Readings in Biblical Hebrew I-II

Hebr 3200—Topics in Biblical Studies: A Book of the Bible

Rabbinic and Medieval Hebrew

Hebr 3111—Rabbinic Texts I

Hebr 3112—Rabbinic Texts II

Hebr 3122—Medieval Hebrew Literature I

Hebr 3123—Medieval Hebrew Literature II

Modern Hebrew

Hebr 3301—Modern Hebrew Prose

Hebr 3302—Modern Literary Prose and Poetry

Electives—Any of the Jewish studies courses may be applied toward the major.

Final Project

A major project is required, including registration in Hebr 3951 (1-4 cr). Students majoring in Hebrew and Jewish studies are required to complete only one major project. The project generally takes the form of a paper, but other forms of project may be considered.

Hebrew Minor

The Hebrew minor permits students who have satisfied the language requirement with Hebrew to use their knowledge to read more widely in sources of antiquity and the middle ages and the modern period and to add to their knowledge of Hebrew civilization and culture. Students must have completed Hebr 3012 or equivalent as certified by an adviser. Upper division requirements include 14 credits of related coursework at 3xxx level or higher in consultation with an adviser to assure a balanced distribution of subjects and genres. Coursework may include courses in Hebrew, ancient Near Eastern studies, or Jewish studies. All courses at the 3xxx level must be taken A-F.

History

Department of History

B.A.

History examines the human experience from its origins to the present. Beyond introductory surveys, courses focus on various regions (Europe, Africa, Asia, Latin America, United States), time periods (ancient, medieval, early modern, and modern), methods (economic, social, quantitative), and comparative themes (colonialism, economic development, sexuality). Interdisciplinary programs incorporate history into a variety of other programs (history of medicine, global studies, medieval studies, women's studies).

Degree Requirements

There are no prerequisites for the undergraduate major. Students take three survey courses (one of which must be writing intensive); six courses at or above 3xxx or 4xxx, including three in an area of concentration; and a senior paper course. Students must take history courses A-F and receive at least a C-. In selecting the ten courses, majors must fulfill three distribution requirements:

1. ***Chronological—***At least two courses from the pre-modern era (roughly pre-1750) and two courses from the modern era (roughly post-1750).
2. ***Geographic—***At least one course in each of two different geographic areas and one of the following courses in world history: Hist 1011W, 1012W, 1015W,1017, 1018, 1019.
3. ***Area of concentration—***At least three courses, 3xxx or higher, representing either a geographical area, a chronological period, a unifying theme, method, or subject, or a combination of these three areas.

An honors major with special courses is offered.

The average freshman entering CLA ranks in the top 20 percent of his or her graduating high school class.

Required Courses

Students must take three of the following survey courses:

Hist 1011, 1012, 1015, 1017, 1018, 1019 (world history)

Hist 1026, 1027, 1031, 1032 (European civilization)

Hist 1301, 1302, 1307, 1308 (U.S. history)

Hist 3051, 3052, 3053 (ancient history)

Hist 3101, 3151, 3152, 3401, 3402, 3431, 3432, 3461, 3462, 3485, 3505, 3541, 3542, 3543 (regional surveys)

Final Project

Students are required to produce a 20-30 page senior paper based on research in both primary and secondary sources. Most majors will do this in a one-semester, 4-credit senior paper course (Hist 3961/4961—Major Paper).

History Minor

Students take a minimum of five history courses for a total of at least 14 upper division credits. These courses must be in at least two different cultural/geographic areas.

History of Medicine

Medical School

Minor Only

History of medicine courses explore the development of medical knowledge, institutions, and practices; the history of diseases; and the place of medicine in Western intellectual and social history.

Requirements

Students take 14 credits in history of medicine courses. This includes at least 6 credits in introductory survey courses (HMed 3001-3002—Health Care in History I-II or HMed 5201-5202) and at least 6 credits in specialized courses at the 5xxx level.

History of Science and Technology

Program in History of Science and Technology

Minor Only

Courses for this minor address the history of science and technology, including the cultural and social contexts of their development.

Requirements

Students take at least 14 credits of 3xxx-5xxx HSci courses; at least 3 of these credits must be at or above 4xxx. Not more than 25 percent of the total 3xxx-5xxx credits in the minor program may consist of directed study, directed instruction, or independent study credits. All courses in the minor must be completed with a grade of C- or better.

Humanities in the West

Humanities Program

Minor Only

Humanities offers integrated study of areas of civilization and major humanistic problems, drawing mainly on primary sources in literature, philosophy, history, the arts, and relevant aspects of the human and natural sciences. This breadth of perspective provides an understanding of men and women as heirs to and creators of civilization, concerned with values and the development of the whole person. Humanities offers a variety of interdisciplinary courses and a minor in humanities in the west.

Requirements

Students take a total of 18 credits as follows. A minimum of 10 credits from the humanities in the west sequence (Hum 1001-1006 or Hum 3001-3006); 8 additional humanities course credits. The minor program must be approved by the humanities program coordinator. Not more than one humanities course in the minor program may be taken at 1xxx. Not more than one 3xxx-4xxx course in the minor program may be taken directed study, directed instruction, or independent study. Not more than one course in the minor program may be taken S-N. All courses in the minor program must be completed with a grade of C- or better.

Individualized Studies

B.I.S.

The Bachelor of Individualized Studies (B.I.S.) is an alternative degree program that provides certain types of flexibility not available in B.A. and B.S. programs. Rather than completing a major within a single field, students focus their coursework on three areas of concentration, one of which may consist of courses from outside CLA. The areas do not have to be related to each other, but the B.I.S. program proposal must include an explanation of the student's overall educational goals.

Working closely with a B.I.S. adviser, students develop program proposals that explain why their academic needs would best be met by an individualized program and list the courses to be included in the program. The B.I.S. proposal must be approved by faculty or department advisers with expertise in the areas of concentration.

In addition, some departments and colleges have established prerequisites or required courses for students who want to include in their B.I.S. programs concentration areas based in those departments and colleges. Consult a B.I.S. adviser for specific information on proposal procedures and on department and college guidelines.

Degree Requirements

To complete the B.I.S., students must complete at least 120 credits, including 50 approved credits at or above 3xxx, distributed among the three concentration areas. The concentration areas may be departmental or thematic in composition, and each must include a minimum of 15 credits at or above 3xxx. Up to 21 credits in the program may be from outside CLA.

A minimum of 20 credits in the B.I.S. concentration areas must be completed after admission to the B.I.S. program.

A maximum of 12 credits of directed studies may be included in a B.I.S. program.

The CLA requirement of 18 credits at or above 3xxx outside the major does not apply.

Final Project

The B.I.S. senior paper requirement is met with a 2,500-word analytic paper written in conjunction with a CLA course in the B.I.S. program.

Individually Designed Interdepartmental Major

B.A.

The IDIM program enables students to fulfill the major program requirements for the B.A. degree by completing an interdepartmental program of coursework focused on a theme of their own choosing, designed in consultation with faculty and staff advisers.

IDIM programs consist of three or four areas of concentration, integrated in such a way that the major has strong thematic unity and coherence.

Working closely with an IDIM adviser, students develop program proposals that explain their academic goals and list a set of courses appropriate for meeting those goals. IDIM program proposals must be approved by three faculty or department advisers with expertise in the areas of concentration. Some departments have established guidelines for students who wish to include in their majors concentration areas based in those departments. Consult an IDIM adviser for specific information on proposal approval procedures and department guidelines.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 50 credits in the major.

The 50 credits must be distributed among three or four concentration areas, with at least 11 credits at 3xxx or above in each area. The concentrations may be departmental or thematic in composition. At least 40 of the 50 credits must be 3xxx or above.

At least 20 credits in the major must be completed after the program has been approved. No more than 12 credits of directed studies may be applied toward the major. The CLA requirement of 18 credits at or above 3xxx outside the major does not apply.

Final Project

Students must complete an integrating senior project, earning at least 2 credits in conjunction with the project. Project proposals must be approved by faculty and staff advisers the semester before the project is begun. Projects may vary widely in form, depending on a student's major. The project proposal and the project itself must be reviewed and approved by one faculty adviser and two faculty readers.

Italian Studies

Department of French and Italian

B.A.

The Italian studies undergraduate program examines Italian literature, history, and culture. Italy, which became a unified nation-state only in 1870, struggled for centuries to escape occupation by other European powers; a diversity of regional centers (including Rome, Florence, Milan, Venice, and Naples) that created distinct linguistic, literary, and cultural expressions.

Department offerings focus on the emergence of Italian nationhood and identity from the Enlightenment and Risorgimento through the Fascist and postwar eras and its reflection in literature and other symbolic expression, with emphasis on problems of gender, and national and cultural boundaries.

Preparatory Coursework—Students take Ital 1001-1004 or equivalent.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 34 credits in the major.

After completing Italian language courses (Ital 1001-1004 or equivalent), majors must take one of third-year language, the Reading Italian Texts course on methods of reading, and two semesters of Italian culture (Ital 3501-3502).

Students round out the nine-course major with five or six electives. Seniors designate one of their papers in the last as their senior project, to be developed in close consultation with faculty.

Required Courses

Ital 3015—Reading, Conversation, and Composition (prerequisite for all upper division courses)

Ital 3201—Reading Italian Texts: Poetics, Rhetoric, Theory (prerequisite for all 4xxx and 5xxx courses)

Ital 3501—The World in the City: Italy 1100-1660

Ital 3502—Making of Modern Italy: From the Enlightenment to the Present

Five electives (3xxx, 4xxx, or 5xxx, courses cannot be taught in English)

Electives—Courses in other departments (such as history, art history, immigration study) may be counted for the major by consent of the major adviser (coursework must be wholly or partially in Italian language).

Final Project

Majors designate one of their term papers in their last as a special final project for development in close consultation with faculty.

Italian Studies Minor

Prerequisite Courses

Ital 1001-1004 or equivalent

Required Courses

At least 19 credits beyond prerequisites taken from the following:

Ital 3015—Reading, Conversation, and Composition (prerequisite for all upper division courses)

Ital 3201—Reading Italian Texts (prerequisite for all 4xxx and 5xxx courses)

Ital 3501—The World in the City: Italy 1100-1660 and Ital 3502—Making of Modern Italy: From the Enlightenment to the Present

Two electives (3xxx, 4xxx, or 5xxx, courses cannot be taught in English)

Japanese

See Asian Languages and Literature.

Jewish Studies

Department of Classical and Near Eastern Studies

B.A.

This broad, interdisciplinary field studies the civilization of the Jewish people from its beginnings in biblical antiquity to the present. The diverse quality of Jewish civilization and the unifying forces of its religion and language offer ample material for the study of continuity, adaptation, and change.

The undergraduate program offers courses in the Bible, Jewish history, Jewish literature, midrash, Jewish philosophy, medieval and modern Jewish studies, Talmud, and rabbinics. The program has links with the Departments of American Studies, Sociology, History, English, German, Music, and Political Science. The University's Center for Holocaust and Genocide Studies offers courses related to the study of the Nazi Holocaust and its aftermath.

For related coursework and major programs in Hebrew language and literature and ancient Near Eastern studies, see other listings under the Department of Classical and Near Eastern Studies.

Study abroad in Israel or Europe is encouraged as a valuable augment to the major; consult the University's Global Campus office for further information.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 30 credits in the major.

The program seeks to

- give students substantive understanding of the historical, religious, literary, philosophical, sociological, and political experiences of the Jewish people.
- demonstrate how scholars of diverse academic disciplines conceptualize and examine issues in their field. Students will learn how to approach the same subject with different perspectives and methodologies.

The program joins humanistic and social scientific approaches to learning. The principal disciplines represented in the program are the Hebrew and Aramaic languages (Yiddish and Arabic when available), history, literature, religious studies, archaeology, art, American studies, women's studies, political science, and sociology.

Required Courses

JwSt 3034—Introduction to Judaism

Students must also complete at least 30 additional credits, distributed as follows:

1. 18 credits in courses of 3xxx-level or above in Jewish languages and literature, social sciences, and philosophy and religion. The major focus of the courses, chosen with adviser approval, should be on the Jewish people and Judaism. At least one course must utilize the methods of the social sciences (sociology, political science) and at least one course must utilize the methods of the humanities (religious studies, history, literature).
2. 6 credits of paired courses. "Paired" courses are courses either from within or outside the Department of Classical and Near Eastern Studies that allow comparison with a related topic in Jewish studies. For example, a pair might consist of JwSt 3034—Introduction to Judaism, and RelA 1031—Introduction to the Religions of South Asia. A Jewish studies adviser will help students construct clusters to suit their interests and educational objectives.
3. Anth 3045—Religion and Culture
4. JwSt 3951—Major Project

Language Requirements

All majors must complete at least two years of Hebrew language study, including Hebr 1001-1002—Beginning Hebrew I-II and Hebr 3011-3012—Intermediate Hebrew I-II. The course sequence of Hebr 3201-3202—Readings in Biblical Hebrew I-II may be substituted for Hebr 3011-3012.

Final Project

A major project is required, including registration in JwSt 3951 (1-4 cr). Students majoring in Hebrew and Jewish studies are required to complete only one major project. The project generally takes the form of a paper, but other forms of project may be considered.

Jewish Studies Minor

Hebr 1001, 1002—Beginning Hebrew I-II or equivalent, as certified by the adviser, JwSt 3034—Introduction to Judaism, and Hebr 3011, 3012—Intermediate Hebrew I-II. At least 6 additional credits of related coursework at 3xxx or above must be chosen in consultation with the adviser. These courses may include courses in Jewish literature of any period or genre, Holocaust studies, and social science courses related to the study of the Jewish people or their religion and culture. All courses at the 3xxx level must be taken A-F.

Journalism and Mass Communication

School of Journalism and Mass Communication

B.A.

The school offers a B.A. major program in journalism with two professional tracks: journalism and strategic communication, and it also offers a mass communication track.

Admission Requirements—The school admits a limited number of undergraduates annually. A student should apply for formal admission to the major after completing or enrolling in Jour 1001 and at least 30 graded (A-F) credits, including one semester of study (12 credits minimum) in CLA. Admission to major status is required before enrolling in Jour 3004, which is a prerequisite for most professional journalism courses. Majors are expected to have typing skills before enrolling in Jour 3101.

Students wishing to emphasize journalism in IDIM (Individually Designed Interdepartmental Major), B.I.S. (Bachelor of Individualized Studies), or ICP (Inter-College Program) must have a 2.80 overall GPA and a grade of C- or better in Jour 1001. Individualized program students must include Jour 3004 in their programs. With adviser approval, 1-3 professional (skills) courses are permitted, but not required.

A 2.80 overall GPA is required for students in the Program for Individualized Learning who wish to include journalism courses in their programs.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 36 credits (professional journalism track and mass communication track) or 37 credits (professional strategic communication track), but no more than 40 credits in the major. All major courses must be completed with grades of C- or better.

About two-thirds of the coursework for the B.A. degree is outside of journalism in the social sciences, humanities, and other liberal arts. The 120-credit requirement must include at least 80 non-journalism credits, including 65 CLA credits.

Journalism courses are categorized in the following way.

Professional (skills) courses: 3101, 3102, 3121, 3155, 3173, 3201, 3202, 3241, 3251, 3279, 3321, 3451, 4131, 4155, 4171, 4174, 4259, 4261, 4263, 4302, 4441, 4442.

Context courses: 3006, 3007, 3008, 3551, 3614, 3741, 3745, 3771, 3776, 3796, 4272, 4274, 4551, 4552, 4615, 4721, 4731, 4801, 5251, 5316, 5501, 5725, 5541, 5601, 5606, 5771, 5777, 5825.

Directed study and specialized topics courses: 3990, 3993, 3996, 4990, 4993H, 5990, 5993.

Professional Journalism Track

The professional track prepares students for careers in areas such as news reporting, editing, and producing. This track is based on a liberal arts foundation, knowledge of the social context in which the professions are practiced, and the skills and experiences needed to succeed in the marketplace.

Required Courses

Core courses: Jour 3004, 3101, 3102, and a capstone course (4131 or 4155 or 4171 or 4174 or 4441 or 4442 or 4990)

Professional courses: 9 credits, including 3 credits at 4xxx, chosen in consultation with a faculty adviser from the following list: Jour 3121, 3155, 3173, 3321, 3451, 4131, 4155, 4171, 4174, 4302, 4441, 4442, 3990/4990/5990 (specialized professional journalism courses, including Charnley course), or professional courses from the strategic communication track (prerequisites must be met).

Context courses: 12 credits, including 3 credits at 4xxx or 5xxx, chosen in consultation with a faculty adviser. Directed study and specialized topics courses may be used to meet this requirement.

Supporting courses: 12 credits at 3xxx, 4xxx, or 5xxx from other departments chosen in consultation with a faculty adviser.

Professional Strategic Communication Track

The professional strategic communication track prepares students for careers in advertising and public relations. This track is based on a liberal arts foundation, knowledge of the social context in which the professions are practiced, and the skills and experiences needed to succeed in the marketplace.

Required Courses

Core courses: Jour 3004, 3201 or 3202, 3251, 4259, 4263.

Professional (skills) courses: 6 credits chosen in consultation with a faculty adviser from among the following: Jour 3241, 3279, 3321, 4261, or 3990/4990/5990 (specialized strategic communication courses), or professional courses from the journalism track (prerequisites must be met).

Context courses: 12 credits, including 3 credits at 3xxx, 4xxx, or 5xxx, chosen in consultation with a faculty adviser. Directed study and specialized topics courses may be used to meet this requirement.

Supporting courses: 12 credits at 3xxx, 4xxx, or 5xxx from other departments, chosen in consultation with a faculty adviser.

Final Project

Journalism majors must complete a major project before graduation. For the professional tracks, this requirement is satisfied by completing two professional (skills) courses (at least one must be 4xxx or 5xxx).

Mass Communication Track

The mass communication track is for students who wish to study the economic, political, legal, and social aspects of mass communication. Students may develop a program emphasis in areas such as history, law, media effects, media industry studies, international communication, or other aspects of mass communication studies represented in the School of Journalism.

Required Courses

Core courses: Jour 3004 and 12 credits including one course from each of these groups:

History: Jour 3007,3614, 4615, 5601, 5606

International/multicultural: Jour 3741, 4801, 5825

Media effects: Jour 3006,3008, 5251, 5316, 5501, 5541

Media and society: Jour 3745, 3771, 3776, 3796, 4274, 4721, 5725, 5771, 5777

Context courses: 18 additional credits chosen in consultation with a faculty adviser. Directed study and specialized topics courses may be used to meet this requirement. With adviser approval, 1-3 professional (skills) courses are permitted, but not required.

Supporting courses: 12 credits at 3xxx, 4xxx, or 5xxx from other departments chosen in consultation with a faculty adviser.

Final Project

Journalism majors must complete a major project before graduation. For the mass communication track, this requirement is satisfied by completing two 4xxx or 5xxx context courses.

Journalism and Mass Communication Minor

Students must complete 18 credits in the minor including,

Jour 1001—Introduction to Mass Communication

Jour 3004—Information for Mass Communication

Jour 3101—News Reporting and Writing

or Jour 3201—Principles of Strategic Communication: Advertising

or Jour 3202—Principles of Strategic Communication: Public Relations,

and three context courses, one of which must be 4xxx or 5xxx.

Students must have a 2.80 overall GPA and a grade of at least C- in Jour 1001 to qualify for admission to the minor program.

Latin

Department of Classical and Near Eastern Studies

B.A.

Modern "Romance" languages (French, Italian, Spanish, and Portuguese) are derived from Latin, as is much English vocabulary. The Latin major allows students to enjoy a large range of literature written over more than a millennium and a half. It is concerned with the language and literature of the Roman Republic and Empire and later Latin literature from the Middle Ages and Renaissance, as well as with Roman religion, history, archaeology and art. It is in its essence interdisciplinary; it also has connections with the study of Greek and other ancient languages and cultures, as well as with the majors in classical civilization and religious studies and minors such as medieval studies.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 30 credits in the major.

The major in Latin has two principal parts, the reading of Latin authors and the study of ancient and medieval civilizations from the broad range of courses offered by the University. The Latin authors include poets such as Virgil and Catullus, historians like Livy and Ammianus, and orators, especially Cicero, as well as later Latin writings like the Confessions of Augustine.

The study of ancient civilization may include courses in Greek and other ancient languages, but at least one must be concerned with ancient culture. A senior project is also required; double majors in Latin and Greek must complete only one senior project.

Many opportunities are open for involvement in student government. Check out the CLA Student Board in 12 Johnston Hall or on the Web at <www.umn.edu/~clasb>.

Required Courses

Prerequisites

Lat 1002 or 1111/1112 or 3111/3112 or 4 yrs high school Latin and one of Clas 1004, 1005, 1006, 1023/3023, 1024/3024

Upper Division Requirements

14 credits in Latin courses at 3113 or above

12 credits of related coursework: at least one course must be in ancient culture above 3000; the remaining credits are from Latin or Greek courses at 3113 or above, any Classics courses above 3000, or other courses in history, art, medieval studies, etc., with approval of director of undergraduate studies

4 credits of senior project (not required if this is the second major of a Latin-and-Greek double major)

Language Requirements

14 credits at Lat 3113 and above (college requirement fulfilled with 3114).

Final Project

A senior project is required; although double majors in Latin and Greek are required to complete only one senior project. The project generally takes the form of a paper, but other forms may be considered.

Latin Minor

The minor program permits those who have satisfied the language requirement with Latin to use their knowledge to read more widely in Latin authors of antiquity and the Middle Ages and to add to their knowledge of Roman and medieval civilization.

Prerequisites

Lat 1002 or 1111/1112 or 3111/3112 or 3113 or 4 yrs high school Latin and one of Clas 1004, 1005, 1006, 1023/3023, 1024/3024.

Upper Division Requirements

Eleven credits in Latin courses at 3113 or above; 3 credits of related coursework at 3xxx or above, which may include courses in Latin, Greek, other ancient languages, Classics courses and other courses in ancient culture.

Latin American Studies

Institute for Global Studies

Minor Only

The minor requires successful completion of Span 1004 or Port 1104 (or equivalent), plus five 3xxx-5xxx courses (totaling at least 15 credits) related to Latin America. Courses must include Geog 4121—Latin America; Hist 3401—Early Latin America to 1825 or Hist 3402—Modern Latin America 1825 to Present; 6 credits of humanities; and 3 additional credits.

A maximum of 3 credits may be in directed studies or directed research and courses must be drawn from a minimum of three different departments. All courses must be taken A-F, with a grade of C- or better. The minor program must be approved by the area studies adviser.

Linguistics

Institute of Linguistics, ESL, and Slavic Languages and Literatures

B.A.

Linguistics is the scientific study of human language. Courses explore the principles governing the structure of natural languages, how languages are acquired by children and adults, the role of language in human cognition and social interaction, and how languages change over time.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 30 credits in the major.

The program offers two coursework options, both building on a common core of courses including an introduction to linguistics and single courses in phonetics and historical linguistics and capped by the senior project.

In addition, Option 1 requires one course in syntax and one in phonology plus 9 additional credits. Option 2 requires a course in linguistic analysis (covering both syntax and phonology) plus 12 additional linguistic credits. Students intending to pursue graduate study in linguistics are advised to select Option 1.

Up to two related courses in other academic programs may be applied to the major with the approval of the director of undergraduate studies. At least seven of the preceding courses must be taken A-F.

Required Courses

Ling 3001 or 5001—Introduction to Linguistics

Ling 3301 or 5301—Introduction to Phonetics

Ling 3601 or 5601—Introduction to Historical Linguistics

Ling 4901—Senior Project

One course in the history and/or structure of a language studied for at least one year at college level (or the equivalent). If such a course is not available, Ling 5931—Fundamentals of Contemporary English or a similar course may be taken with the approval of the director of undergraduate studies.

Option 1

Ling 5201—Introduction to Syntax

Ling 5302—Introduction to Phonology

9 additional credits in 3xxx or 5xxx linguistics courses, excluding 4002, with no more than 6 in any one area, such as phonology or syntax

Option 2

Ling 4002—Linguistic Analysis

12 additional credits in 3xxx-5xxx linguistics courses, excluding 5201 and 5302, with no more than 9 in any one area.

Electives—Related courses in other departments may be applied to the major with the approval of the director of undergraduate studies.

Language Requirements

Three years of college study in one foreign language or two years in one language and one year in a second language. This requirement may be satisfied by examination.

Final Project

Students must complete Ling 4901—Senior Project with a grade of S. The usual requirement for this course is the revision and sometimes expansion of a paper written for another linguistics course, but it may involve an original research paper. Each student completes this paper under the supervision of a professor. The paper must be approved by the director of undergraduate studies.

Linguistics Minor

The minor program must total at least 14 upper division credits and must be approved by the director of undergraduate studies.

Option 1

3001, 3301, 5201, 5302

Option 2

3001, 4002, two additional courses.

Mathematics

School of Mathematics

B.A.

See the Institute of Technology section for the B.S.Math. program.

The School of Mathematics offers a program in the College of Liberal Arts leading to a bachelor of arts degree. The course of study is flexible and may be adapted to satisfy a wide variety of interests and needs. Students may prepare for graduate study in mathematics or may emphasize various fields of interest such as preparation for secondary school teaching, actuarial science, or programs in applied mathematics, including industrial mathematics, mathematics applicable to computer science, and numerical analysis. Programs for the actuarial science, secondary school teaching, and computer science specializations earn a designation that appears on the diploma.

Degree Requirements

At least 120 credits are required for graduation. Students must complete one of the lower division sequences described below and six adviser-approved, upper division courses (including two satisfying the requirement in algebra and two satisfying the requirement in analysis). A senior project is also required.

Students must take all required courses in composition and in the major A-F. A grade of C- or better must be earned in all of these courses.

For details about what courses are appropriate for the actuarial science, secondary teaching, or computer science specializations, consult your adviser or see the publication *Mathematics Major Requirements*, available in the Undergraduate Mathematics Office, 115 Vincent Hall, or on the Web at <www.math.umn.edu>. For courses appropriate for other interests, consult your adviser.

Required Courses

Lower Division Requirements

One of the following sequences:

Math 1271-1272-2243-2263 (Calculus I-II, Linear Algebra and Differential Equations, Multivariable Calculus)

Math 1371-1372-2373-2374 (IT Calculus I-II, IT Linear Algebra and Differential Equations, IT Multivariable Calculus)

Math 1571-1572-2573-3574 (Honors Calculus I-II-III-IV)

Students who have not taken all four semesters of Honors Calculus must also take Math 2283 or Math 3283W. Math 3283W satisfies the requirement of a writing-intensive course in the major.

Upper Division Requirements

Six upper division courses, including two satisfying the algebra requirement and two courses satisfying the analysis requirement.

To satisfy the algebra requirement, a student must take two courses from the following: Math 4242, 5248, 5251, 5285, 5286, 5385, 5705, 5707, 5711 (only one of 5705 or 5707 may be used to satisfy this requirement).

To satisfy the analysis requirement, a student must take two courses from the following: Math 4606, 5486, 5525, 5535, 5583, 5587, 5588, 5615, 5616, 5651, 5652, 5654.

The School of Mathematics will accept Stat 5101 and Stat 5012 as part of the six-course upper division mathematics requirement (content of Stat 5101 is the same as Math 5651—Basic Theory of Probability and Statistics).

Note: Math 4512—Differential Equations with Applications and Math 3113, 3118,4113,4118—Topics in Elementary Mathematics cannot be used as part of the six-course upper division math requirement.

Final Project

All CLA math majors must complete a senior project, Math 4995 or 4997W. Consult your math adviser about this project before the beginning of your senior year.

Mathematics Minor

Students complete all lower division requirements in the major, plus any two adviser-approved upper division courses in the major (including Stat 5101-5102).

Medieval Studies

Center for Medieval Studies

Minor Only

The minor in medieval studies covers the period of roughly between 300 and 1500 A.D. It includes the history, art history, theatre and music history, literature, and languages of the period including Latin, French, Italian, English, Old English, Scandinavian, and German.

The program allows students with an interest in the medieval period or planning to pursue graduate work in one of the related areas to concentrate their studies as a coherent whole.

Requirements

Students complete 15 credits at 3xxx, 4xxx, or 5xxx chosen in consultation with the director of undergraduate studies of CLA's Center for Medieval Studies from approved course lists. All applicable courses originate in other departments. Many of these are cross-listed as MeSt 3610—Topics in Medieval Studies, 4610—Intermediate Topics in Medieval Studies, and 5610—Advanced Topics in Medieval Studies. A list of these and other appropriate courses is available at the Center for Medieval Studies.

Microbiology

Department of Microbiology

B.A.

See the College of Biological Sciences (CBS) section for the B.S. in microbiology.

Microbiology examines the nature and activities of microorganisms, the distinctive microscopic life forms that recycle the elements in aquatic, atmospheric, and soil environments. The field has applications for fields of industry, agriculture, and medicine. As remarkably useful model systems for research, microorganisms play a key role in the development of modern biology. This program prepares students for graduate study or professional work in microbiology as well as other, related biological fields.

Degree Requirements

Students must complete 120 credits to graduate, including 66 credits in the major.

Introductory courses in biology, chemistry, math, and physics are required. In addition, students complete a biochemistry course, a genetics course, MicB 3301—Biology of Microorganisms, four microbiology electives, and two advanced laboratory courses.

Required Courses

Choose introductory biology sequence A, B, or C:

A. Biol 1001–1002—Introductory Biology I–II

B. Biol 1009, Biol 3211, and Biol 2005

C. Biol 1009, Biol 3002, and Biol 3005

Choose one biochemistry course from BioC 3021 or BioC 4331

Choose one genetics course from GCB 3022 or Biol 4003

MicB 3301—Biology of Microorganisms

Choose four microbiology courses from MicB 4111, MicB 4121, MicB 4131, MicB 4141, MicB 4151, MicB 5352

Choose advanced laboratory sequence A or B:

A. MicB 4215, MicB 4235

B. MicB 4215 or MicB 4235 plus 6 credits of MicB 4994

Information about hundreds of internship opportunities with companies such as General Mills, Lucent Technologies, the U.S. Senate, and more can be found through the Career and Community Learning Center (CCLC) at <www.cclc.umn.edu>.

Math 1271-1272—Calculus I–II
Chem 1021-1022—Chemical Principles I–II
Chem 2301-2302—Organic Chemistry I–II
Chem 2311—Organic Lab
Phys 1301-1302—Introductory Physics I–II
or Phys 1201-1202—General Physics I–II

Final Project

Students must complete 6 credits of MicB 4993—Directed Studies or MicB 4994—Directed Research.

Internships are not required but are available. For more information, contact the Office of Student Services in CBS or the University's Career and Community Learning Center (CCLC).

Music

School of Music

Admission Requirements—Admission to a music program—B.A. degree, B.M. degree or the music minor—requires the successful completion of an audition. Auditions are highly competitive with students normally having studied for a number of years: a minimum of 3-4 years in voice, guitar, or on an orchestral or band instrument, 8-12 years on piano. Auditions are held throughout the academic year. Incoming freshmen normally take the audition during the winter of their senior year of high school; transfer students, one semester prior to the term in which they plan to enroll.

Information and guidelines about the audition may be requested from the School of Music (phone 612-624-5740, fax 612-624-8001, e-mail mus-adm@tc.umn.edu).

Although not required, it is helpful to have studied music theory either as a class in high school or college or within the framework of piano lessons.

Upon admission, transfer students are required to take exams in music theory and ear training and piano skills to determine appropriate placement in the sequences of classes within the School of Music. These exams are given in the fall prior to the beginning of classes and during the first week of classes in the spring term. Study materials for these exams are available from the School of Music.

General Requirements—Students should consult with a School of Music adviser in selecting appropriate courses. All music courses required for a degree must be taken A-F, with the exception of the music therapy internship; no S-N credits will count toward the degree requirements. Students must earn a grade of C- or better in major courses to satisfy degree requirements and to progress in sequence courses.

B.A. in Music

The B.A. program is for students who wish to major in music within a broad liberal arts degree program.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 53 credits in the major.

Required Courses

Music Theory and Ear Training (19 cr)
Mus 1501, 1502—Foundations of Musical Theory: Analysis and Ear-Training I-II
Mus 3501, 3502—Theory and Analysis of Tonal Music III-IV
Mus 5501—Intensive Theory and Analysis of 20th-Century Music
One elective theory course from an approved list (3 cr)

Musicology/Ethnomusicology (12 cr)
Mus 1801—Music, Society, and Cultures
Mus 3601, 3602, 3603—History of Western Music I-III

Keyboard (4 cr)
Mus 1151—Piano: Class Lessons I
or Mus 1155 Keyboard Skills I
Mus 1152—Piano: Class Lessons II
or Mus 1156—Keyboard Skills II

Applied Music (8 cr)
MusA 13xx (major instrument or voice)
Concurrent enrollment in an appropriate ensemble is required during each term in which a student is enrolled in applied music.

Ensembles (4 cr)
A list of approved ensembles (1 credit each) is available from the School of Music.

Music Research (3 cr)
Mus 5611—Resources for Music Research
Mus 3995—Major Project

Music Electives (3 cr)
Mus 55xx, 56xx, or 58xx

Final Project

A final research project is required.

B.M. in Music Education

The B.M. in music education is offered with two concentrations: instrumental/general and choral/general. The instrumental/general concentration requires that a student be admitted via the audition on an orchestral or band instrument; for the choral/general concentration, in voice or on piano, organ, or classical guitar.

Admission Requirements—See admission requirements at the beginning of the Music section.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 97.5 credits in the major and professional education courses.

Required Courses

Music Theory and Ear Training (15 cr)
Mus 1501, 1502—Foundations of Musical Theory: Analysis and Ear-Training I-II
Mus 3501, 3502—Theory and Analysis of Tonal Music III-IV
One elective theory course (3 cr) from an approved list

Musicology/Ethnomusicology (12 cr)
Mus 1801—Music, Society, and Cultures
Mus 3601, 3602, 3603—History of Western Music I-III

Keyboard (4 cr)
Mus 1151—Piano: Class Lessons I
or Mus 1155—Keyboard Skills I (2 cr)
Mus 1152—Piano: Class Lessons II
or Mus 1156—Keyboard Skills II (2 cr)

Conducting (2 cr)
Mus 3401—Basic Conducting (2 cr)

Professional Education (12 cr)
EdHD 5001—Learning, Cognition, and Assessment in the Schools
EdHD 5003—Developmental and Individual Differences in Educational Contexts
EdHD 5005—School and Society
EdHD 5009—Human Relations: Applied Skills for School and Society
PubH 5003—Fundamentals of Alcohol and Drug Abuse

In addition to the above coursework, students must choose and complete the coursework for one of the following concentrations.

Instrumental/General Music Education Concentration

Students successfully completing the program will meet licensure requirements to teach band, orchestra, and general classroom music in grades K-12 in Minnesota.

Required Courses (35 cr)

Mus 1260—Voice Class
or MusA 1404—Secondary Voice
MuEd 1201—Introduction to Music Education
MuEd 3302—Teaching Secondary General Music
MuEd 3502—String Techniques and Teaching
MuEd 3503—Woodwind Techniques and Teaching
MuEd 3504—Brass Techniques and Teaching

MuEd 3505—Percussion Techniques and Teaching
MuEd 3516—Instrumental Music Methods and Conducting I
MuEd 3350—Student Teaching in Classroom Music (4 cr)
MuEd 3517—Beginning Instrumental Methods and Materials
MuEd 3518—Instrumental Music Methods and Conducting II
MuEd 3550—Student Teaching in Instrumental Music (6 cr)
MuEd 3650—Student Teaching Seminar (2 cr)

Applied Music (12 cr)

At least six semesters (12 credits) on a major instrument (standard band or orchestral instrument). Includes 8 credits of lower division major lessons (13xx) and 4 credits of upper division major lessons (33xx).

Concurrent enrollment in an appropriate ensemble is required during each semester in which a student is enrolled in applied music.

Ensemble (7 cr)

Band or orchestra required during six semesters of on-campus study, to be selected in consultation with your adviser. Marching band experience is recommended if your major performance instrument is in winds or percussion. Choose 6 credits from Mus 3410—University Wind Bands or Mus 3420—Orchestra.

Chamber ensemble is required during one semester of on-campus study. Choose 1 credit from any of the following: Mus 3340—Jazz Ensemble, Mus 3350—Jazz Combo, Mus 3440—Chamber Ensemble, Mus 5430—Concerto Grosso Ensemble, Mus 5470—Woodwind Chamber Ensemble, Mus 5480—University Brass Choir, Mus 5490—Percussion Ensemble.

Choral/General Music Education Concentration

This program is for students majoring in voice, piano, organ, or classical guitar who want to teach choral and classroom music in the elementary and secondary schools. Students successfully completing the program will meet licensure requirements to teach choral and general classroom music in grades K-12 in Minnesota.

Required Courses (24 cr)

MuEd 1201—Introduction to Music Education
MuEd 3301—Teaching Elementary Vocal and General Music
MuEd 3350—Student Teaching in Classroom Music
MuEd 3415, 3416—Choral Conducting and Methods I-II
MuEd 3450—Student Teaching in Vocal Music
MuEd 3650—Student Teaching Seminar

Applied Music (18-22 cr)

At least seven semesters (14 credits) in piano, voice, or classical guitar is required, including 8 credits of lower division major lessons (13xx) and 6 credits of upper division major lessons (33xx). For non-voice majors, MusA 1404—Voice-Secondary is required (4 cr). For non-piano majors, MusA 1401—Piano-Secondary is required (4 cr).

Concurrent enrollment in an appropriate ensemble is required during each semester in which a student is enrolled in applied music 13xx or 33xx.

Ensemble (7 cr)

Mus 3230—Chorus or Mus 5240—Chamber Singers is required during seven semesters (1 cr each) of on-campus study, to be selected in consultation with your adviser.

B.M. in Music Performance

The B.M. in performance is a professional degree in which music courses comprise approximately 75 percent of the program.

Admission Requirements—See admission requirements at the beginning of the Music section.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 78 credits in music.

Required Courses

Music Theory and Ear Training (19 cr)

Mus 1501, 1502—Foundations of Musical Theory: Analysis and Ear-Training I-II
Mus 3501, 3502—Theory and Analysis of Tonal Music III-IV
Mus 5501—Intensive Theory and Analysis of 20th Century Music
One elective theory course (3 cr) from an approved list

Musicology/Ethnomusicology (12 cr)

Mus 1801—Music, Society, and Cultures
Mus 3601, 3602, 3603—History of Western Music I-III

Keyboard (4 cr)

Mus 1151—Piano: Class Lessons I
or Mus 1155—Keyboard Skills I
Mus 1152—Piano: Class Lessons II
or Mus 1156—Keyboard Skills II

Conducting (2 cr)

Mus 3401—Basic Conducting

Applied Music (32 cr)

MusA 13xx (8 cr)
MusA 23xx (8 cr)
MusA 33xx (16 cr)
Mus 0901—Junior Recital (0 cr)
Mus 0951—Senior Recital (0 cr)

Concurrent enrollment in an appropriate ensemble is required during each semester in which a student is enrolled in applied music.

Ensembles (4-8 semesters)

See departmental guidelines for ensemble requirements. A primary ensemble must be taken concurrently with major-level applied lessons.

Major requirements in addition to the core curriculum:

String, Woodwind, Brass, and Percussion Majors

Mus xxxx Chamber ensembles (4 cr)

Piano Majors

Mus 5141—Piano Literature (2 cr)

Organ Majors

Mus 5131, 5132—Advanced Keyboard Skills I-II (2 cr each)
Mus 5151, 5152—Organ Literature I-II (3 cr each)

Voice Majors

Mus 3261—Italian Diction for Singers (1 cr)
Mus 3262—English Diction for Singers (1 cr)
Mus 3263—German Diction for Singers (1 cr)
Mus 3264—French Diction for Singers (1 cr)
Mus 3241—Vocal Literature I: German Lieder (1 cr)
Mus 3242—Vocal Literature II: French Melodie (1 cr)

Voice majors in the B.M. program must complete one semester each of French, German, and Italian. These language courses will substitute for the 8 credits of upper division elective coursework stipulated by CLA's outside-of-major requirement.

Recital

Junior and senior recitals are required for all programs in the Performance B.M. (Mus 0901—Junior Recital, Mus 0951—Senior Recital).

B.M. in Music Therapy

This program prepares students for a profession in music therapy, utilizing music to influence behavioral changes in people, from pre-school through geriatrics, in a variety of educational and health-related environments.

Admission Requirements—See admission requirements at the beginning of the Music section.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 99 credits in the major.

Required Courses

Music Theory and Ear Training (15 cr)

Mus 1501, 1502—Foundations of Musical Theory: Analysis and Ear Training I-II
Mus 3501, 3502—Theory and Analysis of Tonal Music III-IV
One elective theory course (3 cr) from an approved list

Musicology/Ethnomusicology (12 cr)

Mus 1801—Music, Society, and Cultures
Mus 3601, 3602, 3603—History of Western Music I-III

Keyboard (4 cr)

Mus 1151—Piano: Class Lessons I
or Mus 1155—Keyboard Skills I
Mus 1152—Piano: Class Lessons II
or Mus 1156—Keyboard Skills II

Conducting (2 cr)

Mus 3401—Basic Conducting

Music Therapy (45 cr)

MuEd 1801—Introduction to Music Therapy
MuEd 3800—Introduction to Clinical Music Therapy Practice
MuEd 3801—Psychology of Music
MuEd 3804—Applications of Music Therapy I: Music Therapy for Children in Rehabilitative Settings
MuEd 3805—Applications of Music Therapy II: Music Therapy in Long Term Care and Psychiatric Care
MuEd 3806—Preparing for a Music Therapy Career
MuEd 3855—Music Therapy Internship (6 months, full time)
MuEd 3415—Choral Conducting and Methods I
MuEd 3502—String Techniques and Teaching
MuEd 3503—Woodwind Techniques and Teaching
MuEd 3504—Brass Techniques and Teaching
MuEd 3505—Percussion Techniques and Teaching

Applied Music (12 cr)

Minimum six semesters (12 credits). Includes 4-6 credits lower division major lessons (13xx) and 4-6 credits secondary lessons (14xx).
Concurrent enrollment in an appropriate ensemble is required during each semester in which a student is enrolled in applied music.

Ensemble (6 cr)

Six semesters (1 cr each) of on-campus study to be selected in consultation with your adviser.
Related coursework in behavioral/social/health sciences and special education is required. Consult with your adviser for specific courses.

Internship

A six-month internship is required upon completion of all coursework. You should meet with your major adviser early in the spring semester of your junior year to plan the internship. You must have completed all coursework to be eligible to register for MuEd 3855—Music Therapy Internship (12 cr).

Music Minor

A minor in music is available for students majoring in other fields. An entrance audition identical to that for a music major is required. The following coursework must be completed with grades of C- or better:

Music Theory and Ear Training (7 cr)

Mus 1501, 1502—Foundations of Musical Theory: Analysis and Ear-Training I-II

Musicology/Ethnomusicology (6 cr)

Two courses selected from the following:
Mus 1801—Music, Society, and Cultures
Mus 3601, 3602, 3603—History of Western Music I-III

Keyboard (4 cr)

Mus 1151—Piano: Class Lessons I
or Mus 1155—Keyboard Skills I
Mus 1152—Piano: Class Lessons II
or Mus 1156—Keyboard Skills II

Applied Music (4 cr)

MusA 13xx (major instrument or voice)

Ensembles (2 cr)

Mus 3230—Chorus
or Mus 3410—University Wind Bands
or Mus 3420—Orchestra

New Media Studies

Interdisciplinary

Minor Only

This interdisciplinary minor explores from multiple perspectives how information or content is created and shaped in new and emerging media, as well as the role and impact of those media on human communication. New media refers to the emerging digital technologies that enable information to be produced, stored, transmitted, and displayed in various ways. This minor includes courses from the Colleges of Liberal Arts, Human Ecology, and Agricultural, Food and Environmental Sciences.

Requirements

Students complete at least 15 credits distributed as follows:

Two to three courses (minimum 6 credits) selected from the following: Jour 3551, Jour 3552, Jour 4551, Jour 4552
Two to three courses (minimum 6 credits) from approved list of elective courses. Consult the School of Journalism for list of approved elective courses.

All courses must be taken A-F and only courses completed with a grade of C- or better count toward the minor. A maximum of eight credits of elective courses may be earned from a single department.

Philosophy

Department of Philosophy

B.A.

This program offers an analysis and critique of fundamental beliefs and favored methods of the arts and sciences. Fields within the program are moral and political philosophy, history of philosophy, logic, philosophy of science, metaphysics, epistemology, and aesthetics.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 30 credits in the major.

Students must complete at least eight philosophy courses, totaling at least 30 credits. No more than two of these courses can be 1xxx. At least three courses must be at 4xxx or above. At least 1 credit must be earned in conjunction with the senior project through registration in one of the following courses: Phil 3910—Major Seminar, Phil 3993—Directed Studies, or Phil 4993—Directed Studies.

Required Courses

One history of philosophy course (4 cr each)
Phil 3001—General History of Western Philosophy: Ancient Period
or Phil 3005—General History of Western Philosophy: Modern Period

One logic course (4 cr each)
Phil 1001—Introduction to Logic
or Phil 5201—Symbolic Logic I

One epistemology course
Phil 4105—Epistemology (3 cr)
or Phil 3601—Scientific Thought (4 cr)

One ethical theory course
Phil 3311—Introduction to Ethical Theory (4 cr)
or Phil 4310—History of Moral Theories (3 cr)
or Phil 4320—Intensive Study of an Historical Moral Theory (3 cr)
or Phil 4321—Theories of Justice (3 cr)

Electives—Students must complete at least three elective courses in philosophy. It is strongly recommended that one of these be a second course in the history of philosophy.

Final Project

A senior project is required and is typically a paper and must be completed as part of Phil 3993—Directed Studies, Phil 4993—Directed Studies, or in conjunction with the Phil 3910—Major Seminar.

Philosophy Minor

Students must complete at least 14 credits in philosophy courses at 3xxx or above.

Physics

School of Physics and Astronomy

B.A.

See the Institute of Technology section for the B.S.Phys. program.

Physics studies the fundamental properties and interactions of all forms of matter. Experimental and theoretical investigations are combined to formulate mathematical relationships that describe and predict the behavior of nature.

The physics undergraduate program can prepare students for employment, often in an industrial or governmental laboratory. The program can also prepare students for further study at graduate or professional schools in physics, engineering, biophysics, medicine, education, law, or business.

The physics B.A. program is a liberal arts degree providing the flexibility to integrate a broad foundation in physics with coursework in physics or other disciplines.

The required courses form a minimum program—students preparing for a specific career path may want to take more physics courses than required. Electives should be chosen to customize the physics degree to the individual need of the student. Students should consult a physics adviser to help formulate objectives for undergraduate study.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 37 credits in the major.

This minimum must include six required lower division physics courses, two physics courses selected from the basic upper division physics courses, two upper division physics electives, and an additional physics project. Additional courses must include four lower division calculus courses and the remaining University liberal education requirements.

Physics majors must take all required physics and mathematics courses A-F and must earn a grade of C- or better in all of those courses (except those offered S-N only). Only students with grades of B or better in the introductory physics courses can generally expect to succeed in the major.

Required Courses

Phys 1301, 1302, 2503 or Phys 1401, 1402, 2403
Phys 2601—Quantum Physics
Phys 2605—Quantum Physics Laboratory
18 credits of 4xxx physics courses, including at least two courses from Phys 4001, 4002, 4101, 4201
A physics project must be completed, either by completing Phys 4052—Methods of Experimental Physics II or by some other means approved by the department. In either case, any credits earned may be counted toward the 18 required 4xxx credits.
Either of the following four-semester mathematics sequences: Math 1271, 1272, 2243, 2263 or Math 1371, 1372, 2373, 2374

Final Project

A physics project is required. This can be satisfied by completion of Phys 4052—Methods of Experimental Physics II, in which case the 5 credits earned may be counted towards the 18-credit requirement specified under "Required Courses." Other ways of satisfying the physics project requirement must be approved by the physics department.

Physics Minor

The minor in physics requires 22 credits in physics and 12 credits in math, distributed as follows:

Math 1271, 1272, 2243 or Math 1371, 1372, 2373
Phys 1301, 1302, 2503 or Phys 1401, 1402, 2403
Phys 2201—Introductory Thermal and Statistical Physics
Phys 2601—Quantum Physics
Phys 2605—Quantum Physics Laboratory
3 credits in physics or astrophysics at 3xxx or above

Physiology

Department of Physiology

B.A.

The physiology major concentrates on understanding the functions of the human body from individual cells to organ systems. The program is based upon principles from a variety of physical and biological sciences.

This major is particularly appropriate for students who intend to enter medical school or graduate study in any of a variety of biological, health, or biomedical sciences. The required courses form a strong core in biomedical science. Many of the required courses are identical to those required for admission to medical school. Students may tailor the overall degree program to specific needs and may choose additional science courses in preparation for medical school or graduate school. Students may also take advantage of the freedom to pursue a more diverse undergraduate experience in CLA. Others may benefit from an opportunity to pursue a double major.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 27 credits in the major. Lower division preparation for the physiology major includes integral calculus, general chemistry, and one year of physics with laboratory. All students take principles of human physiology for majors, organic chemistry with laboratory, biochemistry, genetics, and cell biology. In addition, two upper division elective courses are required for a total of four credits. These courses are chosen from a variety of pre-approved options in science or mathematics. Students

The University of Minnesota Marching Band has nearly 300 members. It was formed in 1892 as a Cadet Corps with only 29 musicians.

may petition the director of undergraduate studies to approve additional courses as electives. Honors students must also complete at least three credits of Phsl 4095—Honors Physiology, and *summa* candidates must write an approved *summa* thesis.

Required Courses

BioC 3021 or BioC 4331—Biochemistry
Biol 4003—Genetics
Biol 4004—Cell Biology
Chem 2301—Organic Chemistry I
Chem 2302—Organic Chemistry II
Chem 2311—Organic Lab
Phsl 3071—Principles of Physiology for Majors
Two electives from a broad range of math- or science-related courses totaling 4 credits.

Political Science

Department of Political Science

B.A.

Political scientists study topics such as the exercise of power and influence; sources and resolution of conflicts; the relation of politics to the economy, culture, and other aspects of society; the adoption and implementation of public policies; and the development of political systems. These topics are studied at all levels, from local communities to the global community.

The scope of the discipline is reflected in the main areas of specialization that make up the undergraduate curriculum: political theory, comparative government and politics, international relations, and American governmental systems and processes.

In addition, undergraduates may choose from several *optional* concentrations: business and politics; campaigns and elections; citizenship and civic action; global politics; law and politics; democratization and development; political psychology, beliefs, and behavior; and public affairs.

Preparatory Coursework—All students must complete one 1xxx course in political science with a grade of C- or better before admittance to the major.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 32 credits in the major.

The 32 credits must include at least 24 upper division credits. The required 3xxx, 4xxx, or 5xxx courses must include at least one course in each of three of the following four subfields: political theory, comparative government, American government, and international relations. Up to 6 credits of internship and fieldwork courses can be counted toward the 24-credit upper division requirement.

Students must also complete a major paper.

In order to receive credit toward the major, all coursework must be taken A-F and grades of C- or better must be achieved. (The sole exception to this policy are those internship and fieldwork courses that are available only S-N.)

New Advanced Standing (NAS) students and transfer students from outside the University's Twin Cities campus must complete at least 12 3xxx, 4xxx, and/or 5xxx credits in political science courses on the Twin Cities campus before graduation.

University students who enroll in a study abroad program through the Global Campus, the National Student Exchange Program, or elsewhere and who plan to take political science courses at other universities may transfer no more than twelve (12) upper division political science credits into their major program here.

Optional Concentrations

Students may earn an optional concentration designation by completing at least four courses from one of the concentrations listed below:

Business and politics: Pol 3085, 3110, 3352 4308, 4315, 4327, 4331, 4481, 4483, 4523, 4833, 4889

Campaigns and elections: Pol 3085, 3110, 3225, 3352, 3766, 4306, 4308, 4331, 4461, 4483, 4737, 4767

Citizenship and civic action: Pol 3110, 3210, 3215, 3225, 3235, 3251, 3252, 3253, 3323, 3739, 3873, 4210, 4275, 4303, 4322, 4502, 4766, 4483, 4485, 4487, 4885, 5251, 5252, 5253

Global politics: Pol 3110, 3235, 3441, 3451, 3477, 3835, 3872, 3873, 4461, 4467, 4471, 4473, 4477, 4478, 4479, 4485, 4832, 4833, 4836, 4881, 4883, 4885, 4887, 4889

Law and politics: Pol 3110, 3225, 3252, 3253, 3323, 3872, 4275, 4309, 4501, 4502, 4523, 4561, 4881, 4883, 5252, 5253

Democratization and development: Pol 3110, 3210, 3235, 3253, 3323, 3441, 3477, 3739, 4210, 4275, 4303, 4322, 4471, 4473, 4477, 4478, 4479, 4487, 4561, 4766, 4885, 4889, 5253

Political psychology, beliefs, and behavior: Pol 3085, 3110, 3253, 3323, 3739, 3766, 4275, 4306, 4308, 4331, 4483, 4485, 4766, 4836, 4887, 5253

Public affairs: Pol 3085, 3110, 3215, 3235, 3321, 4306, 4308, 4309, 4315, 4322, 4327, 4481, 4483, 4501, 4523, 4832, 4833, 4836, 4881

Final Project

Students must enroll in Pol 4900 and submit a senior project or paper to the department. The paper or project should be completed in conjunction with an upper division political science elective.

Political Science Minor

Students must complete at least four courses, totaling at least 16 credits. Students must take at least one course in two of the following four subfields: A) political theory, B) comparative government, C) American government, and D) international relations.

A maximum of 8 credits at 1xxx may be applied toward the minor. The following courses cannot count toward fulfillment of the advanced coursework requirement: Pol 3070—Faculty-Supervised Individual Field Work, Pol 3080—Faculty-Supervised Individual Internships, Pol 3751—Fieldwork in Politics, and Pol 4970—Individual Reading and Research.

Psychology

Department of Psychology

B.A.

Psychology examines human behavior through environmental, genetic, physiological, and social determinants and correlates. The department strives to train students with a strong general background in psychology and an ability to think clearly and critically in a wide variety of settings. Students must fulfill distribution requirements in a wide variety of psychological topics.

Faculty and students work with related University units, including the Institute of Child Development, the Department of Computer Science and Engineering, the Carlson School of Management, the Departments of Psychiatry and Educational Psychology, the Department of Neuroscience, and affiliated research units within the department, such as the Center for Cognitive Sciences, the Center for Interest Measurement Research, and the Minnesota Center for Twin and Family Research. While a B.A. in psychology has proved to be a valuable and useful background for a wide variety of careers, a professional career as a psychologist requires further training.

Students completing the degree program in psychology may not receive a second degree in child psychology.

Psychology B.A. degree candidates may not use course credits from child psychology or educational psychology to count toward the required 18 3xxx, 4xxx, and 5xxx credits outside the major department.

Preparatory Coursework—Psy 1001—Introduction to Psychology.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 36 credits in the major, 32 of which must be at the upper division level.

Degree requirements include Psy 1001—Introduction to Psychology (or its equivalent) and Psy 3005W—Introduction to Research Methods and Statistics. Students must also complete at least 24 additional credits of 3xxx, 4xxx, or 5xxx psychology courses, distributed across prescribed subject domains, and Psy 3902W—Major Project in Psychology.

All courses used to fulfill minimum requirements must be taken A-F. Students must receive a grade of C- or better for all courses in the major. Students must graduate with a cumulative GPA of 2.00 or better in courses taken to fulfill major requirements.

Transfer students must complete at least four upper division psychology courses at the University to be awarded a major in psychology.

Required Courses

Psy 1001—Introduction to Psychology

Psy 3005W—Introduction to Research Methods and Statistics

Two courses from Group A—cognitive and biological area: Psy 3011, 3031, 3051, 3061 or 5061, 4011, 4036, 5012W, 5013, 5014, 5015, 5031W, 5034, 5036W, 5037, 5038W, 5051W, 5054, 5062, 5064.

Two courses from Group B—clinical, personality and social areas: Psy 3101 or 5101, 3201, 3301, 3604 or 5604H, 3617, 3666, 5202, 5204, 5205, 5206, 5207, 5606. Child psychology courses CPsy 3301, CPsy 4303 may also be used to fulfill this area for the major.

One course from Group C—individual differences, quantitative and applied areas: Psy 3135 or 5135, 3137 and 5137, 3711, 4133, 4501, 4801, 5121, 5136, 5137, 5138, 5501, 5701, 5702, 5703, 5705, 5862, 5865.

Electives from 3xxx, 4xxx, or 5xxx psychology courses to satisfy the total minimum credit requirement (36 credits). A total of two courses from Psy 3960/5960, 3993/4993, 3994 and 3996/4996H may be used.

Psy 3902W—Major Project in Psychology

Psychology Minor

Undergraduate minors in psychology are offered in three tracks: general psychology, natural/biological science, and social science. All three tracks require completion of Psy 1001 and Psy 3005W plus four additional courses, for at least 20 credits.

General Psychology Track

One course from Group A of the major, one course from Group B, one course from Group C, and one elective course from any of the groups.

Natural/Biological Science Track

Three courses from Group A and one course from the following: Psy 3101 or 5101, 3135 or 5135, 3137 and 5137, 3604 or 5604H, 3666, 5136, 5137, 5206, 5606.

Social Science Track

Three courses from Group B and one course from: Psy 3135 or 5135, 3711, 4133, 4501, 5121, 5136, 5138, 5501, 5701, 5702, 5703, 5705.

Religious Studies

Department of Classical and Near Eastern Studies

B.A.

This program introduces students to the critical study of religions, particularly the religions of antiquity. To ensure direct experience of the central texts of at least one religious tradition there is a strong element of language study. Advanced courses are required in Judaism, classical paganism and Christianity, and ancient philosophy. Concentration on the religious thought and practice of the distant past makes possible a longer perspective on religious issues and a balanced understanding of this important aspect of human behavior.

Degree Requirements

Students must complete at least 120 credits to graduate, including 31 credits in the major. The major includes 6 credits of electives (which may include, but are not necessarily limited to, Bible, Greek, and Roman religion; religion in the ancient Near East; religion in late antiquity and early Middle Ages; philosophy and social science approaches to religion; and further language study if the reading is in religious texts) and courses on the Old Testament, the New Testament, either Greek and Hellenistic religion or Roman religion and early Christianity, a comparative course on another religious tradition, and a course on philosophy. A major project is also required.

Required Courses

RelA/ANE 3201—The Bible

RelA/Clas 3072/5072—The New Testament

RelA/Clas 3071/5071—Greek and Hellenistic Religions

or RelA/Clas 3073/5073—Roman Religion and Early Christianity

Phil 3001—Ancient Philosophy or other appropriate philosophy course

One comparative course certified by the director of undergraduate studies (e.g., Islam, American religions, East Asian religions)

6 credits of electives (may include language courses on religious texts)

Senior project

CLA's Martin Luther King, Jr. (MLK) Program provides support, guidance, and information to enhance the undergraduate experience of students of color.

Language Requirements

One of the following languages is required of majors, and the 4 credits of the language count toward the 31 credits of the major.

Lat 3114
or Grk 3114
or Hebr 3012
or Skt 5202

Final Project

A senior project is required. This usually takes the form of a paper.

Religious Studies Minor

The minor in religious studies allows those in other majors to acquire some of the means needed for the critical study of religion. Five courses are required, of which four must be upper division courses, for a total of at least 14 upper division credits. At least one course must be taken in each of two of the following three categories: comparative study, methodology-and-philosophy, Bible-and-religion-in-antiquity. Not more than one of these courses may be a directed study course and no more than one course may be taken S-N. Grades of D are not applicable to the minor program.

Russian

Institute of Linguistics, ESL, and Slavic Languages and Literatures

B.A.

The Slavic and Central Asian Languages and Literatures unit offers study of the Russian, Polish, and Iranic and Turkic languages of Central Asia as well as literature and culture of the Slavic world and Central Asia. The unit offers a major and a minor in Russian language and literature.

Preparatory Coursework—Students take two years of college-level Russian language study (Russ 1101-1102—Beginning Russian I and II, Russ 3001-3002—Intermediate Russian I and II completed with a minimum grade of C-) or the equivalent.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 30 credits in the major.

Students must reach a level of advanced proficiency in Russian language and attain a thorough grounding in the history of Russian literature and modern Russian culture by taking required and elective courses as specified below. Students must submit a senior thesis showing familiarity with and use of Russian language sources.

Required Courses

Students must complete 30 credits of 3xxx or 5xxx courses beyond preparatory courses.
Russ 3101 and 3102—Advanced Russian I and II
Russ 3421—Literature: Middle Ages to Dostoevsky in Translation
and Russ 3422—Literature: Tolstoy to the Present in Translation
Russ 3512—Russian Art and Culture from Peter I to the Present
Four electives (totaling 12 credits) chosen from 3xxx or 5xxx Russian courses (excluding preparatory courses)
Russ 3311—Russian Major Project

Russian Minor

Preparatory courses: Russ 1101, 1102

Minor requirements: Russ 3001, 3002 and 6 additional credits in 3xxx-5xxx Russian courses, excluding preparatory courses

Russian Area Studies

Institute for Global Studies

Minor Only

The minor requires successful completion of the first year of Russian language (or equivalent), plus five courses (15 credits) related to Russia distributed as follows:

Geog 3181—Russia and Environs
or Pol 4471—After Communism: Russia and the Commonwealth of Independent States
and 6 credits (two courses) in upper division courses
Hist 3636—Conquest, Colonization, and Centralization: The History of European Russia, ca. 700 to ca. 1700
or Hist 3637—Modern Russia: From Peter the Great to the Present
Russ 3421—Literature: Middle Ages to Dostoevsky in Translation
or Russ 3422—Literature: Tolstoy to the Present in Translation
Students must complete at least two courses in humanities. The minor must be approved by the area studies adviser.

Scandinavian Languages and Finnish

Department of German, Scandinavian, and Dutch

B.A.

The program teaches and conducts research in the languages and literature of the Scandinavian countries, including Finland, in the context of relevant cultural-historical background. Majors and minors are offered with concentrations in Danish, Finnish, Norwegian, and Swedish.

Preparatory Coursework—The Graduation Proficiency Test in Danish, Finnish, Norwegian, or Swedish. Students may declare the major at any time during the preparatory coursework.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 34 credits in the major.

This includes a core curriculum of 22 credits and an additional 12 credits of electives. One of these elective courses may be an appropriate social science course pertaining to Scandinavia, subject to the approval of the director of undergraduate studies. The major program must be approved by the director of undergraduate studies.

Required Courses

Dan, Nor, or Swed 3011 and Scan 3012
or Fin 3011 and Fin 3012
GSD 3451—Major Project Seminar
or GSD 3452 Honors Major Project Seminar
Three courses selected from the following:
Scan 3501—Scandinavian Culture Past and Present
Scan 3502—Scandinavian Myths
Scan 3503—Scandinavian Folklore
Scan 3504—The Immigrant Experience
Scan 3601—Great Literary Works of Scandinavia
3 additional 3xxx, 4xxx, or 5xxx credits in Scandinavian languages and literature; one elective may be taken in an appropriate social science course in consultation with the director of undergraduate studies.

Electives—Appropriate courses in the social sciences that deal with Scandinavian topics. Scandinavian area studies courses are offered in departments such as geography, history, and sociology.

Final Project

All majors must complete GSD 3451—Major Project in German and Scandinavian.

Scandinavian Languages and Finnish Minor

Students pursuing a minor must complete at least 14 credits. Students must complete 3011 in one of the following four languages: Danish, Finnish, Norwegian, or Swedish, and Scan 3012 *or* Fin 3012 (totaling 8 credits), and 6 additional 3xxx, 4xxx or 5xxx credits in Scandinavian languages and literature.

Sociology

Department of Sociology

Sociology examines stability and change in social life by addressing the underlying patterns of social relations in formal organizations, in legal institutions, and in the family, economy, and political arena.

Coursework focuses on the criminal justice system and criminal behavior; mental health; families and close relationships; education; population (demography); urban and rural communities; politics and policy formation; social movements and social change; diverse racial and ethnic groups; and social psychology. Faculty interests in the comparative study of social relations and institutions in China, France, Japan, Germany, and African and Scandinavian countries add a strong international emphasis to these areas of study. All sociology courses emphasize the skills of social inquiry necessary for analyzing patterns of social relationships.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 31 credits in the major.

All major and minor coursework must be taken A-F unless a course is only offered S-N. Courses must be completed with a grade of C- or better. Graduating with a major in sociology requires a 2.00 GPA in sociology coursework.

Transfer students who wish to be sociology majors must meet the major requirements either through coursework completed at their transfer institution or the University of Minnesota, with at least 9 credits of coursework from the University's Department of Sociology.

B.A.

Two B.A. options are offered—Sociology: General and Sociology: Law, Criminology, and Deviance (LCD).

Preparatory Coursework—Prospective majors must complete or be enrolled in an introductory sociology course (Soc 1001 or 1011 or the equivalent from a transfer college) before officially declaring the major.

Required Courses

Prerequisite to most upper level sociology courses is Soc 1001—Introduction to Sociology.

Sociology: General

Soc 3701—Social Theory (4 cr)

Soc 3811—Basic Social Statistics (4 cr)

Soc 3801—Sociological Research Methods (4 cr)

At least 15 sociology elective credits (five courses), including at least 3 credits (one course) at the 4xxx level.

Sociology: Law, Criminology, and Deviance (LCD)

Soc 3701—Social Theory (3 cr)

Soc 3811—Basic Social Statistics (4 cr)

Soc 3801—Sociological Research Methods (4 cr)

Soc 3111—Introduction to Crime and Criminal Justice

At least 12 elective credits (four courses), including at least 3 credits (one course) of general sociology electives at the 3xxx or 4xxx level and at least 6 credits (two courses) of LCD electives (4xxx)

Electives—None from other departments, unless they are cross-listed with sociology and taught by a faculty member approved by the sociology department (usually approved for associate membership in the Department of Sociology).

Final Project

This requirement can be met by enrolling in Soc 4966—Advanced Project Seminar (4 cr) in order to develop a research paper, or by enrolling in Soc 4967—Advanced Senior Project Independent Study (1 cr) in conjunction with an upper division sociology elective (3 cr) taught by the same faculty member who is guiding their project. Students may also satisfy this requirement by completing a directed study (4 cr) with a faculty member. Department approval required to enroll in any senior project option.

Internships are not required. However, students are strongly encouraged to participate in at least one internship in the community to gain applied experience and expertise, which proves useful in preparing for career entry. Some sociology courses may provide a community service learning opportunity.

B.S.

The B.S. program is for students interested in developing a rigorous mathematical concentration in research methodologies. Two B.S. options are offered: Sociology: General and Sociology: Law, Criminology, and Deviance (LCD).

Preparatory Coursework—Prospective majors must complete or be enrolled in an introductory sociology course (Soc 1001—Introduction to Sociology or Soc 1011—Honors: Introduction to Sociology or the equivalent from a transfer college) before officially declaring the major. B.S. majors are encouraged to complete two semesters of calculus before declaring the B.S. major, providing the background necessary to complete other courses on the supportive field list of choices. Calculus is often a prerequisite for those courses.

Degree Requirements

The B.S. option extends and builds on course requirements for the B.A. program by including a supportive program of four upper division courses focusing on technical and quantitative aspects of social research.

The supportive field courses consist of four additional courses (12-16 cr) at 3xxx , 4xxx, or 5xxx, from departments of computer science, economics, mathematics, philosophy, psychology, educational psychology, and statistics. Consult the sociology undergraduate adviser for more information about what courses are appropriate for the sociology B.S. supportive field program.

Required Courses

See Required Courses in Sociology B.A.

Final Project

See Final Project in Sociology B.A.

Sociology Minor

Two minor options are offered: Sociology: General and Sociology: Law, Criminology, and Deviance (LCD).

Students in both minor programs must complete Soc 1001—Introduction to Sociology or 1011—Honors: Introduction to Sociology (3 cr each)

Six out of twelve of the University's highest ranking programs—ranked by the National Research Council—are in CLA.

Sociology: General (14 cr)

Soc 3701—Social Theory (4 cr)

Soc 3811—Basic Social Statistics (4 cr) or (if statistics has been completed in another department) Soc 3801—Sociological Research Methods (4 cr)

Two electives (totaling 6 cr) chosen from any 3xxx or 4xxx sociology electives

Law, Criminology, and Deviance (LCD) (16 cr, consisting of at least five courses)

Soc 3111—Introduction to Crime and Criminal Justice (3 cr)

Soc 3701—Social Theory (4 cr) or Soc 3811—Basic Social Statistics (4 cr) or Soc 3801—Sociological Research Methods (4 cr)

One upper level non-criminology sociology course (3 cr)

Two 41xx electives (6 cr total) chosen from the LCD area of sociology.

One course in either minor may be taken S-N. The remaining credits must be graded A-C.

South Asian and Middle Eastern Area Studies

Institute for Global Studies

Minor Only

The minor requires completion of five 3xxx-5xxx courses (totaling at least 15 credits) related to South Asia and the Middle East. Courses must be distributed as follows: minimum of one course (at least 3 credits) from the humanities; minimum of one course (at least 3 credits) from the social sciences or history.

A maximum of 3 credits may be in directed studies or directed research and courses must be drawn from a minimum of three different departments. All courses must be taken A-F, with a grade of C or better. The minor program must be approved by the area studies adviser.

Spanish Studies

Department of Spanish and Portuguese Studies

The program develops analytical skills and methodologies needed to explore Hispanic, Hispanic-American, and Luso-Brazilian languages and cultures. The department offers two majors (Spanish studies and combined Spanish-Portuguese studies) and two minors (Spanish studies and Portuguese studies).

It is important to note that department majors and minors are not simply Spanish and Portuguese language majors or minors, rather, they are liberal arts majors and minors concentrating on Spanish, Latin American and/or Luso-Brazilian literary, cultural, and linguistic studies with language skills at the foundation. All major and minor options in this department begin with prerequisite language courses, followed by advanced language skills courses (special arrangements may be made for native speakers of Spanish). These are followed by critical analysis skills courses in Hispanic literature, culture, and linguistics that prepare students to take advanced coursework in specific areas. The major options culminate in the completion of an individual major research project through the Graduation Seminar. All major and minor courses must be taken A-F and completed with grades of C- or better. Spanish and Portuguese courses taught in English and credits earned in community tutorial programs are not acceptable for major or minor credit. Program plans are carefully structured through courses that must be taken in sequential order—contact the department adviser for more detailed information. Any deviation from course prerequisites (e.g., substitution of language courses for native speakers of Spanish or Portuguese) must be approved in advance by the director of undergraduate studies through the department advising office, 5C Folwell Hall.

The department strongly encourages majors and minors to study abroad in a Spanish or Portuguese-speaking area. Students who wish to complete department program requirements through study abroad must meet with the department adviser prior to departure. Detailed information regarding Spanish and Portuguese studies undergraduate academic issues is printed in the department *Undergraduate Advising Handbook*, available in the department advising office, 5C Folwell Hall.

B.A. in Spanish Studies

Preparatory Coursework—Span 1001, 1002, 1003, 1004/1014 or the equivalent and an appropriate passing score on the Graduation Proficiency Test (GPT) in Spanish.

Students must declare the major in the department before completing the majority of major requirements and are encouraged to declare the major within the department as early as possible (preferably during preparatory coursework). Contact the department advising office for declaration procedures.

Degree Requirements

Students must complete 120 credits to graduate, including at least 34 credits in the major. Students must complete at least 9 credits (3 courses) of advanced upper division elective coursework from the Department of Spanish and Portuguese Studies.

Required Courses

Span 3015—Spanish Composition and Communication

Span 3021—Advanced Communication Skills

or department-approved substitute

Span 3104—Analysis and Interpretation of Texts

Span 3105—Introduction to the Study of Hispanic Civilizations

Span 3107—Introduction to the Study of Hispanic Linguistics

15 to 18 additional elective credits in approved 3xxx or 5xxx literature, culture, and linguistics courses, chosen in consultation with the department adviser. (At least 12 credits must be in courses with a Span 31xx prerequisite.)

Span 3972—Graduation Seminar (see Final Project information below)

Language Requirements

The department emphasizes student initiative and responsibility in acquiring a high level of language proficiency that is crucial for successful completion of courses beyond Span 3021 and Port 3003. The department sponsors study abroad programs in Mexico, Venezuela, and Spain; offers a course incorporating service learning in the local Chicano-Latino community; and makes available a language tutoring lab (including conversation hours) and advanced writing center during the academic year while courses are in session. A campus residence community, Casa de Español, is dedicated to speaking Spanish.

Final Project

All B.A. candidates must complete a major project in Spanish by registering in and attending Span 3972—Graduation Seminar. Graduation seminar informational/preparatory sessions are available in the department several times a year. Clearance for seminar registration must be obtained from the department adviser. Students pursuing a second CLA major may choose to complete the major project requirement in the other major. These students are required to substitute Span 3972 with 3 credits in advanced electives in the Spanish or Spanish and Portuguese major.

Spanish Studies Minor

Students must declare the minor within the department at least one full term before completing minor requirements and are encouraged to declare it as early as possible (preferably during preparatory coursework). Contact the department advising office for declaration procedures.

Preparatory Coursework—Span 1001, 1002, 1003, 1004/1014 and an appropriate passing score on the Graduation Proficiency Test in Spanish.

Required Courses

Span 3015—Spanish Composition and Communication

Span 3021—Advanced Communication Skills or a department-approved substitute

At least one of the following: Span 3104, 3105 or 3107

Six additional credits in approved 3xxx or 5xxx literature, culture and/or linguistics courses, chosen in consultation with the department adviser. These courses must be taught in Spanish and have at least a Span 3015/ Span 3021 prerequisite.

B.A. in Spanish-Portuguese Studies (combined)

Degree Requirements

Students must complete 120 credits to graduate, including at least 35 credits in the major. Students must complete at least 9 credits (3 courses) of advanced upper division elective coursework from the Department of Spanish and Portuguese Studies.

The Spanish-Portuguese studies major is under review and requirements may change at any time. Requirements at the time of this publication are specified herein but students interested in this major should consult with the department adviser regarding possible changes. Students must declare the major within the department before completing the majority of major requirements and are encouraged to declare the major as early as possible (preferably during preparatory prerequisite stages). Contact the department advising office for declaration procedures.

Preparatory Coursework—Span 1001, 1002, 1003, 1004/1014 or the equivalent and an appropriate passing score on the Graduation Proficiency Test in Spanish; and Port 3001 *or* Port 1101, 1102, 1103, 1104 or the equivalent and a passing score on the Graduation Proficiency Test in Portuguese.

Required Courses

Port 3003—Portuguese Conversation and Composition

Span 3015—Spanish Composition and Communication

Span 3021—Advanced Communication Skills

Span 3104—Analysis and Interpretation of Texts

Span 3105—Introduction to the Study of Hispanic Civilizations

Span 3107—Introduction to the Study of Hispanic Linguistics

12-15 additional elective credits in approved 3xxx or 5xxx literature, culture, and linguistics courses, chosen in consultation with the department adviser. (Minimum six credits each in Spanish and Portuguese. At least 9 credits must be in courses with a 31xx prerequisite.)

Span 3972—Graduation Seminar (see Final Project information)

Language Requirements

The department emphasizes student initiative and responsibility in acquiring a high level of language proficiency that is crucial for successful completion of courses beyond Span 3021 and Port 3003. The department sponsors study abroad programs in Mexico, Venezuela, and Spain; offers a course incorporating service learning in the local Chicano-Latino community; and makes available a language tutoring lab (including conversation hours) and advanced writing center during the academic year while courses are in session. A campus residence community, Casa de Español, is dedicated to speaking Spanish.

Final Project

All B.A. candidates must complete a major project in Spanish or Portuguese by registering in and attending Span 3972—Graduation Seminar. Graduation seminar informational/preparatory sessions are available in the department several times a year. Clearance for seminar registration must be obtained from the department adviser.

Portuguese Studies Minor

Students must declare the Portuguese studies minor within the department at least one full term before completing minor requirements and are encouraged to declare it as early as possible (preferably during preparatory coursework). Contact the department advising office for declaration procedures.

Preparatory Coursework—Port 1101, 1102, 1103, 1104 or the equivalent and a passing score on the GPT in Portuguese.

Required Courses

Port 3003—Portuguese Conversation and Composition

Four additional 3xxx or 5xxx courses taught in Portuguese. All courses must be chosen in consultation with the department adviser.

Speech and Hearing Science

Department of Communication Disorders

B.A.

The curriculum examines the physical, biological, and behavioral foundations of human communication. Courses focus on the study of normal speech, language, and hearing processes, and seek to apply that knowledge to identifying, preventing, evaluating, and managing disordered speech, language, and hearing.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 40 credits in the major.

Majors are advised to select additional courses beyond those needed to satisfy the liberal education requirements in the behavioral, biological, cognitive, physical, and social sciences; mathematics; statistics; and research design and methodology.

For information about study abroad programs, contact the Global Campus, 230 Heller Hall, 612-626-9000.

Students planning to pursue a graduate degree are advised to register for courses required for the B.A. major on an A-F grade basis.

Required Courses

Students must complete 40 credits of required courses in this list:

CDis 1301—The Physics and Biology of Spoken Language
CDis 1401—Introduction to Communication Disorders
CDis 3301—Introduction to Acoustics
CDis 3302—Anatomy and Physiology of the Speech and Hearing Mechanisms
CDis 3303—Language Acquisition and Science
CDis 3304—Phonetics
CDis 3305—Speech Science
CDis 3306—Hearing Science
CDis 3402—Major Project in Speech and Hearing Science
CDis 4501—Speech Disorders
CDis 4601—Language Disorders
CDis 4801—Hearing Measurement and Disorders

Final Project

Completion of CDis 3402—Major Project in Speech and Hearing Science.

Speech and Hearing Science Minor

Choose 14 credit hours from any 3xxx, 4xxx, or 5xxx courses in the Department of Communication Disorders. No more than 20 percent of total credits in the minor program may consist of directed study. All courses in the minor program must be completed with a grade of C- or better.

Statistics

School of Statistics

B.A.

See the Institute of Technology for the B.S.Stat. program.

Statistics provides a logical framework for the collection, analysis, and interpretation of data. This data can be used to draw inferences in scientific studies and to make decisions in industrial, business, and governmental enterprises.

Degree Requirements

Students must complete 120 credits to graduate, including at least 38 credits in the major.

Requirements include 38 credits with grade C- or better, in math (including multivariable calculus) and statistics (including one year of theory and three applied statistics courses) and one computer programming course.

Required Courses

Stat 3011—Introduction to Statistical Analysis
or 3021—Introduction to Probability and Statistics
Stat 3022—Data Analysis
Stat 4101-4102—Theory of Statistics I-II
or Stat 5101-5102—Theory of Statistics I-II
Stat 4893—Senior Paper
At least 10 credits of adviser-approved statistics electives chosen from the following: Stat 5031, 5041, 5201, 5302, 5303, 5401, 5421, 5601
Math 2263—Multivariable Calculus
Math 4242—Applied Linear Algebra
One course chosen from the following: CSci 1103, CSci 1107, CSci 1113

Final Project

Majors must complete a senior project through registration in Stat 4893—Senior Paper.

Statistics Minor

Students must complete at least 14 credits from 3xxx, 4xxx, and 5xxx School of Statistics courses, including at least two 5xxx courses.

Studies in Cinema and Media Culture

Department of Cultural Studies and Comparative Literature

B.A.

Studies in cinema and media culture (SCMC) approaches the study of cinema by emphasizing its location within the intricate social, historical, and cultural matrix of audiovisual forms and practices. Core courses and electives are offered not only in the Department of Cultural Studies and Comparative Literature (CSCL) but also in a number of other contributing departments. Through the program's interdisciplinary framework, students explore the sounds and images of cinema as they have changed throughout the 19th and 20th centuries. Print, photography, radio, television, video, and digital media will also be considered crucial to understanding the unique hybridity and expanse of the cinematic medium.

Students

- develop the ability to "read" the production and circulation of meaning in cinema, especially within the institutions of mass culture;
- examine the history of cinema cultures;
- engage the cross-cultural and global dynamics of cinema production and reception; and
- explore the theoretical models that have shaped thinking about the cinema and its relations to other media.

Although the major includes a production component, its principal focus is on cultural contexts, history, and theory.

Note: Effective fall 2001 the studies in cinema and media culture major replaced the film studies major. Currently declared film studies majors have the option of either completing their degree in film studies or transferring to the new SCMC major. The director of undergraduate studies can help students transfer programs.

Degree Requirements

Students complete 32 credits in approved major courses. Grades in the major must be C- or better.

Required Courses

I. Core courses

SCMC 1201—Introduction to Cinema and Media Culture
or ArtH 1921—Introduction to Film Study
or CSCL 1201—Visual Culture
or CSCL 1921—Introduction to Film Study
SCMC 3001—Introduction to Cinema and Media History
or ArtH 3921—Art of the Film
SCMC 5001—Critical Debates in Cinema and Media Culture
or CSCL—Basic Concepts of Cinema

II. Four additional courses (3xxx, 4xxx, and 5xxx), one from each of the following:

1) Questions of context: society, history, culture
2) Questions of practice: production and training
3) Questions of difference: national, international and foreign cinemas
4) Questions of analysis: theory, method, critique

III. Three electives drawn from approved list, one of which may be 1xxx, and one of which (3xxx, 4xxx, 5xxx) may serve as a basis for the senior project.

Final Project

The senior project requirement may be satisfied by completing one course (3xxx, 4xxx, or 5xxx). Senior projects that involve production (short films, video installations, computer games, and the like) are welcome, but emphasis in SCMC falls on research and critical analysis.

Note: Students may use topics or other repeatable courses (those whose numbers end in 0; e.g., Comm 5210) for the distribution requirements in section II, with adviser approval.

Studies in Cinema and Media Culture Minor

SCMC 1201 or ArtH 1921 or CSCL 1201 or CSCL 1921 plus fourteen additional credits from 3xxx, 4xxx, or 5xxx courses, taken from the list of approved courses in the major.

Note: A maximum of two 3xxx, 4xxx, or 5xxx courses may be topics courses and/or independent or directed study courses.

Theatre Arts

Department of Theatre Arts and Dance

B.A.

This degree program offers study of the art form in both theoretical historical context and the practice of live dramatic performance. Course offerings include theatre history and dramatic literature; acting, movement, and voice; directing; design and technology for scenery, costume, lighting, makeup, and sound; and management.

Coursework also embraces theatre as a group art, an art in which individual excellence is often fully realized only in collaboration with other artists. The practical application of the art encourages students to test classroom experiences under the pressure of public performance in the laboratory of the University Theatre.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 43 credits in the major.

This requirement includes 10 credits of electives at any level from either theatre arts or dance courses, at least 3 credits of which must be a content course. The major credits also include 4 credits of practicum (Th 3100—Theatre Practicum), only 2 credits of which may be in acting. Students are required to maintain a 2.00 GPA in the major. Transfer students must take at least 12 credits in this department, at least 1 credit of which must be Th 3100.

Required Courses

Th 1101—Fundamentals of Performance
Th 1322—Creating the Performance
Th 1351—Vocal Production and Beginning Movement for Actors
Th 3513—Design and Technical Production I
Th 3515—Design and Technical Production II
Th 3171—History of the Theatre: Ancient Greece through Neo-Classicism
Th 3172—History of the Theatre: Age of Enlightenment
Th 4177—Survey of Dramatic Literature I
or Th 4178—Survey of Dramatic Literature II
Th 3100—Theatre Practicum

Electives—Courses in art, art history, dance, dramatic literature, humanities, music, and playwriting are recommended as electives.

Final Project

All majors must complete Th 4901—Senior Seminar.

Theatre Arts Minor

The theatre arts minor consists of the following courses, for a total of 24 credits:

Th 1101—Fundamentals of Performance
Th 1322—Creating the Performance
Th 3513—Design and Technical Production I
Th 3515—Design and Technical Production II
Any two of the following: Th 3171, 3172, 4177, 4178

B.F.A. in Acting

The B.F.A. in acting is an intensive, individualized, actor training program that utilizes both faculty from theatre and dance as well as the Guthrie Theater's professional artistic staff to provide selected students with the physical, vocal, emotional, and intellectual skills necessary to succeed as working performance artists. The degree is intended to prepare students for entry into advanced education at a conservatory or for professional employment.

Degree Requirements

Students must complete at least 120 credits to graduate, including 59 credits of specified acting coursework (speech, voice, movement), performance before an audience, and independent study; and 26 credits of general theatre studies. Entry into this degree program is by audition only and students are admitted in fall semester only.

Urban Studies

This cross-disciplinary major involves urban studies coursework, fieldwork experiences, internships, and coursework in disciplines that offer useful perspectives on contemporary urban and postindustrial society.

The program focuses on the conceptual and analytical frameworks and specialized skills needed for professions focused on urban change or development. Students completing the program work in public agencies or private business or pursue graduate study in urban planning, law, social welfare, public affairs, or the social and environmental sciences.

Students are encouraged to incorporate field study into the major or minor. Options include urban studies programs sponsored by the Higher Education Consortium for Urban Affairs (HECUA) in South America, Norway, and Minneapolis-St. Paul.

B.A.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 36 credits in the major.

The program requires two courses focusing on urban form and society, with three additional courses from one of the following broad concentration areas: cultural analysis, and political economy, and infrastructure. Students complete two skills and methods courses.

Students must complete the following courses within the program: an introductory course, two urban studies colloquia, two workshops, an internship, and a senior paper. The program requires two courses focusing on urban form and society, with three additional courses from one of the following broad concentration areas: cultural analysis, and political economy, and infrastructure. Students complete two skills and methods courses. An internship and a senior paper are also required. The *Urban Studies Program Booklet*, available from the department, contains a listing of required and recommended courses, and urban-related course offerings in other academic departments that can fulfill various urban studies requirements. For more information, see <http://urbanstudies.cla.umn.edu>.

The National Research Council ranks the statistics program as one of the top 15 in the nation.

Required Courses

UrbS 1001—Introduction to Urban Studies: The Complexity of Metropolitan Life
or UrbS 3001—Introduction to Urban Studies: The Complexity of Metropolitan Life

Two sessions of UrbS 3201 or UrbS 3202 (2 cr total)

Two sessions of UrbS 3500—Urban Studies Workshop (6 cr total)

UrbS 3900—Urban Studies Internship Seminar

UrbS 3955—Senior Paper Seminar

Electives

Two courses of at least 6 credits of skills or methods courses from the list in the *Urban Studies Program Booklet* (available online).

Courses from appropriate departments are identified; students choose five of these courses in identified tracks (at least 15 cr total). See the *Urban Studies Program Booklet* (available online) for a complete listing of courses that may be applied.

Final Project

Students must complete UrbS 3955—Senior Paper Seminar.

B.S.

Degree Requirements

See Degree Requirements for the B.A.

Required Courses

The required courses for the Urban Studies B.S. are the same as those for the B.A. except for the number of required elective courses below.

Electives

Four courses totaling at least 12 credits of skills or methods courses identified in the *Urban Studies Program Booklet.*

Final Project

Students must complete UrbS 3955—Senior Paper Seminar.

Urban Studies Minor

Students pursuing a minor must consult with a program adviser to make course selections and to receive final credit verification before graduation.

The minor requires completion of 14 upper division credits, including:

UrbS 1001—Introduction to Urban Studies: The Complexity of Metropolitan Life
or UrbS 3001—Introduction to Urban Studies: The Complexity of Metropolitan Life

Two sessions of UrbS 3201 or UrbS 3202 (2 cr total)

One session of UrbS 3500—Urban Studies Workshop (3 cr total)

Two courses from one of the tracks described in the *Urban Studies Program Booklet*, (6 cr total).

Women's Studies

Department of Women's Studies

B.A.

Women's studies offers an interdisciplinary curriculum that looks at issues of women and gender in the United States and around the world, taking into account significant social and historical variables. Women's studies also seeks to transform traditional fields of study by incorporating new data, methods, theories, and frameworks developed by feminist scholars.

The undergraduate curriculum offers five subfield concentrations: methods of inquiry; biology, psychology, and social perspectives; literature, language, film, and the arts; comparative and global studies; and civic and community studies.

In addition to the faculty in women's studies, several departments lend their interdisciplinary teaching and advisory expertise to women's studies students. Among these are the Departments of African American and African Studies; American Studies; American Indian Studies; Chicano Studies; Communication Studies; Comparative Studies in Discourse and Society; English; German, Scandinavian, and Dutch; History; Philosophy; Sociology; and Spanish and Portuguese. Affiliated programs include the School of Nursing; the Hubert H. Humphrey Institute of Public Affairs' Center on Women and Public Policy; the MacArthur Interdisciplinary Program on Global Change, Sustainability, and Justice; the Tucker Center for Research on Girls and Women in Sport; and the Center for Advanced Feminist Studies.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 36 credits in the major.

Required Courses

Students must complete 27 to 30 credits of required courses plus upper level electives as needed to reach 36 credits.

WoSt 1001—Introduction to Women's Studies (3-4 cr)
or WoSt 1002—Politics of Sex (4 cr)

One of the following 3-4 credit courses: WoSt 1003, 3001, 3002, 3003, 3004

WoSt 3102—Feminist Thought and Theory (3-4 cr)
or WoSt 4402—History of Western Feminism (3 cr)

One upper level course satisfying the department's cultural pluralism requirement (minimum 3 cr). WoSt 3001, 3002, 3003, and 3004 may not be used to fulfill this requirement.

One upper level course satisfying the department's international studies requirement (minimum 3 cr). WoSt 3001, 3002, 3003, or 3004 may not be used to fulfill this requirement.

WoSt 4107—Senior Research Methods (3 cr)

Women's studies majors must complete two junior-senior seminars or one junior-senior seminar and WoSt 4109—Field Learning (internship) and concurrent registration in WoSt 4993—Directed Study (1 cr) under the supervision of the student's senior project faculty adviser.

Under special circumstances, a student with a well-defined project that cannot be accommodated within the junior-senior seminars may do one junior-senior seminar and a directed study. Students write a 20-25 page paper for each of their two choices.

Electives—In addition to WoSt courses, this category includes all of the program's officially cross-listed courses.

Women's Studies Minor

The women's studies minor requires 18 credits.

WoSt 1001—Introduction to Women's Studies (3-4 cr)
or WoSt 1002—Politics of Sex (3-4 cr)

Five upper level courses. No more than one of the following courses may be used to fulfill this requirement: WoSt 3002, 3003, and 3004.

No more than 4 credits may be taken S-N and no more than 6 credits may be directed study or internship projects.

Carlson School of Management

This is the Carlson School of Management section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Carlson School of Management

General Information

History
- Founded in 1919
- Named the Curtis L. Carlson School of Management in 1986

Faculty and Staff
- 112 faculty, including 24 endowed faculty
- 228 staff members

Alumni
- 38,500 alumni
- Located in 50 states, Washington D.C., and 70 foreign countries
- 70 Outstanding Achievement Awards

Rankings
- Ranked 14th among all business schools and 9th among all public business schools by *U.S. News & World Report,* 2001
- Evening M.B.A. program ranked 12th in country by *U.S. News & World Report,* 2001
- M.B.A. program ranked 30th in the country by *U.S. News & World Report,* 2001
- Included in *Business Week's* list of top 50 M.B.A. business schools, 2000
- Ranked 15th in *Business Week's* survey of M.B.A. employers
- Ranked one of 25 best business schools for entrepreneurs, *Success Magazine,* 1994-1995
- MIS area ranked 3rd in country by *U.S. News & World Report,* 2000
- Ranked among the top 25 "Techno-M.B.A. Programs" in country, *Computerworld,* 2001
- Industrial relations program ranked 2nd in the country by the *Gourman Report,* 2000
- M.H.A. program ranked 4th by *U.S. News & World Report,* 2000
- Students entering Ph.D.-business program rank 5th, based on GMAT test scores*

* *Annual Carlson School of Management survey of 25 top Ph.D.-business programs*

Degrees Awarded
- Bachelor of science in business (B.S.B.)
- Master of business administration (M.B.A.)
- Executive M.B.A. (C.E.M.B.A.)
- Master of arts in health care administration (M.H.A.)
- Master of arts in human resources and industrial relations (M.A.H.R.I.R.)
- Master of business taxation (M.B.T.)
- Master of science in management of technology (M.S.-M.O.T.)
- Doctorate in business administration (Ph.D. Business)
- Doctorate in industrial relations (Ph.D. I.R.)

2000-2001 Enrollments
- 1500 undergraduates
- 250 M.B.A. day students
- 1025 M.B.A. evening students
- 54 M.H.A. day students
- 90 C.E.M.B.A. students
- 140 M.A.H.R.I.R. day students
- 100 M.A.H.R.I.R. evening students
- 150 M.B.T. students
- 60 M.S.-M.O.T. students
- 87 Ph.D.-business administration students
- 15 Ph.D.-industrial relations students

2000-2001 Placement Statistics
Average salaries of new graduates:
- B.S.B.-$42,200
- M.B.A.—$78,662
- M.A.H.R.I.R.—$55,940

Professional Education
- *Executive Development Center*
  Human Resources Executive Program
  Advantage Program for M.B.A.s
  Minnesota Management Academy
  Minnesota Management Institute
  Minnesota Executive Program
  Strategic Leadership Program
  21st Century Program
  Marketing Strategy Program
  Executive Presentations Program
  Project Management Program
- *Industrial Relations Service*
  Labor Education Service

Carlson Sponsored International Programs
- M.B.A., H.R.I.R., and M.H.A. student exchange programs in Australia, Belgium, Brazil, Costa Rica, England, France, Japan, New Zealand, Spain, Sweden, and Switzerland
- Short-term global enrichment electives for undergraduate and graduate students including the Vienna Seminar and Vienna Summer Program with Wirtschaftsuniversitat Wien in Austria, the Lyon Summer Program with Universite' Jean Moulin-Lyon III in France, and for graduate students only, the Costa Rica Seminar with the Instituto Centroamericano de Administracion de Empresas
- Joint executive M.B.A. degree program with Warsaw School of Economics, Poland
- Joint executive M.B.A. degree program with Wirtschaftsuniversitat Wein, Austria
- Joint executive M.B.A. degree program with Lingnan College (University) in Guanzhou, China
- Undergraduate study abroad in Austria, France, Germany, Italy, Netherlands, Norway, New Zealand, Spain and Singapore (Other study abroad opportunities also available through the Global Campus)
- Undergraduate exchange programs with University of Maastricht Business School, The Netherlands, Universite Jean Moulin Lyon III, France, the Norwegian School of Management BI, Norway, ESC Bordeaux, France, and Wirtschaftsuniversitat Wien, Austria.
- Faculty exchange programs in China, France, Japan, Austria, and Poland

Accreditation
American Assembly of Collegiate Schools of Business

Research Centers
Accounting Research Center
Center for Research in Marketing
Center for Entrepreneurial Studies
Industrial Relations Center
Information Industry Initiative
Institute for Financial Studies
Logistics Management Center
MIS Research Center
MN Center for Insurance Research
Juran Center for Leadership in Quality
Strategic Management Research Center
Carlson School of Management Research Information Center

The mission of the Carlson School of Management (CSOM) is to advance the practice of management in the context of a global economy with increasing technological and social change. To do this, the Carlson School must be a leader in the development of knowledge valued by the management profession and in the dissemination of this knowledge to students, practitioners, and academia. Moreover, the Carlson School must recognize its responsibilities to exercise leadership in fostering the intellectual and economic vitality of Minnesota and the region through its research, teaching, and outreach programs.

Admission

Each year Carlson admits approximately 300 freshmen, 40 sophomores, and 80 juniors.

Freshman Admission

The Carlson School of Management admits students based on an overall assessment of the applicant's background and accomplishments as presented in the application materials. Freshman admission is in especially high demand. In addition to very strong academic records, applicants should have strong leadership and service experience. Among the factors considered in the application review are academic performance (i.e. completion of the high school preparation requirements, a strong background in math and science, high school class rank, ACT/SAT scores and competitiveness of curriculum), demonstrated leadership skills, and active participation in extra-curricular activities.

The following profile of the class of fall 2001 is intended as a guideline to help students assess their qualifications for admission:

1. Average high school rank 92nd percentile
2. Average ACT score 27.4
3. Average AAR score 146.9

The formula below shows how to calculate ACT aptitude rating (AAR) using high school rank percentile and ACT test scores.

ACT Aptitude Rating (AAR):

High school rank percentile + (2 x ACT composite score)

Applicants who submit a complete application by the December 15 priority application deadline will receive priority consideration for admission. Applications postmarked or completed after the priority deadline are reviewed on a space-available basis. Applications are available at <http://admissions.tc.umn.edu> on the Web and from the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E. Minneapolis, MN 55455 (612-625-2008 or 800-752-1000).

Admission at the Sophomore Year

A limited number of sophomores from within the University of Minnesota system are admitted each fall. (Transfer students should refer to Admission to the Upper Division Carlson Major Programs)

To be considered for admission as a sophomore, the following standards apply:

- Completion of 30–49 credits (at least 50 percent of the total credits must be taken from the University of Minnesota)
- Completion of microeconomics, macroeconomics, and calculus

Students should complete both the *Change of College* form and the *Carlson School Addendum*, available at the Student Service Center, 200 Fraser Hall or 130 West Bank Skyway, or the Carlson School Undergraduate Studies Office, 1-105 Carlson School of Management, by the May 1st deadline.

Admission to Upper Division Carlson Major Programs

Students from within the University of Minnesota system and from other institutions may apply directly to the upper division program. Applications are reviewed for fall admission only and should be submitted by the May 1st deadline.

To be considered for admission at the junior level or higher, the following standards apply:

- Completion of 50 or more semester credits
- Completion of calculus, microeconomics, macroeconomics, business statistics, and introduction to financial accounting

Transfer Admission

Transfer admission is competitive and is based on an overall assessment of the applicant's background and accomplishments as presented in the application materials. Applicants who have completed the required tool courses and who have at least a 3.00 GPA are considered. In addition to very strong academic records, applicants should have strong leadership, service, and/or work experience. Academic performance is assessed from three perspectives: overall GPA and rigor of curriculum; GPA in the tool courses listed on page 206; and GPA in the most recent work (approximately the last 30 credits). The application addendum, which must be completed in addition to the application, provides the basis for assessing an applicant's accomplishments outside the classroom.

If transferring from within the University of Minnesota system, students should complete the *Change of College* form and the *Carlson School Addendum*, available at the Student Service Center, 200 Fraser Hall or 130 West Bank Skyway, or the Carlson School Undergraduate Studies Office, 1-105 Carlson School of Management.

If transferring from outside the University, students should obtain an admission application and the *Application Addendum* at the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2008). Students must request that an official transcript from each college attended be sent directly from the college to the Office of Admissions. In addition, a nonrefundable $35 application fee must accompany the application.

How Credits Transfer to Carlson

Transferable credits completed at another institution may be used to meet admission requirements. Junior- and senior-level business courses from other institutions are usually accepted for general elective credit. Courses must be evaluated by an appropriate faculty member before they can be used in lieu of Carlson upper division course requirements. To have courses evaluated, students should bring their syllabi to the Undergraduate Studies Office in 1-105 Carlson School of Management after admission to the program. CSOM does not normally accept lower division transfer coursework in lieu of upper division course requirements.

Note: If students have earned a bachelor's degree in business from another four-year institution, they may not earn a second bachelor's degree from the Carlson School.

Foreign Credits

If students earned credit at a recognized educational institution abroad, the credits may transfer to the Carlson School if the coursework meets specific lower division distribution requirements or upper division elective requirements, as determined by the admissions coordinator. If students completed credits at a foreign institution before admission to the University of Minnesota, the credits are generally accepted on the S-N grading system only.

Non-degree Seeking Students

If students are interested in taking day school courses but not in earning a degree and have a bachelor's degree or business experience and a strong undergraduate record, they may apply to Carlson as a non-degree seeking student.

Students admitted as non-degree seeking students who later decide to become degree candidates must satisfy Carlson's admission requirements and apply to transfer into a degree program.

Applications for admission with non-degree seeking status are available in the Office of Admissions, 240 Williamson Hall.

Degrees

Baccalaureate Programs

A Carlson degree combines management and liberal arts coursework to provide students with strong communication, analytical, and creative problem-solving skills. The Carlson School offers programs leading to the bachelor of science in business (B.S.B.) with majors in accounting, actuarial science, entrepreneurial studies, finance, human resources and industrial relations, risk management and insurance, international business, management information systems (MIS), marketing, supply chain management, and a self-designed general management major.

Because of the globalization of the U.S. economy, the school encourages all students to spend at least one semester in a study abroad program during their undergraduate program.

Certified Public Accountant (C.P.A.)

The C.P.A. license is awarded by the state, not the University. The C.P.A. examination is generally given each spring and fall. For detailed information, contact the Minnesota State Board of Accountancy (651-296-7937).

Graduate Programs

Carlson, in conjunction with the Graduate School, offers programs leading to the degrees of master of business administration (M.B.A.), master of business taxation (M.B.T.), and doctor of philosophy (Ph.D.). The Department of Industrial Relations, in conjunction with the Graduate School, offers programs in industrial relations leading to the degrees of master of arts (M.A.H.R.I.R.) and doctor of philosophy (Ph.D.). Complete descriptions of these programs and graduate-level courses in these areas are in the *Graduate School Catalog* at <www.catalogs.umn.edu/grad/index.html> as well as in the publications of each program.

Master of Business Administration (M.B.A.)

Two M.B.A. programs are offered. For complete information, contact the M.B.A. program office in 2-210 Carlson School of Management, 321 19th Avenue S., Minneapolis, MN 55455 (612-624-0006).

Master of Science in Management of Technology (M.S.-M.O.T.)

A master's degree in the management of technology is offered through the Center for the Development of Technological Leadership, cosponsored by Carlson and the Institute of Technology. The program prepares experienced engineers and scientists for management roles in technology-intensive organizations. Classes are held on Fridays and Saturdays. For more information, contact the M.S.-M.O.T. Program, Center for the Development of Technological Leadership, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55455 (612-624-5747).

The Carlson Executive M.B.A. (C.E.M.B.A.) Program

This 64-credit program is for individuals with eight to ten years of full-time professional or managerial experience and an undergraduate degree in any field. C.E.M.B.A. is an eighteen-month program that meets all day on campus Friday and Saturday, every other week. The curriculum has a strategic management focus that heavily emphasizes interactive learning. C.E.M.B.A. students participate in two weeklong residencies each year at a northern Minnesota resort and a nine-day international residency abroad in the second year of the program. The program provides a full range of customer services such as book purchases, registration, meals, and parking. For more information about the C.E.M.B.A. program, contact the Carlson Executive M.B.A. (C.E.M.B.A.) Program, 4-106 Carlson School of Management, 321 19th Ave. S., Minneapolis, MN 55455 (612-624-1385).

Master of Health Care Administration (M.H.A.)

The M.H.A. program combines strong curriculum with hands-on experience to prepare students for leadership roles in health care organizations. High-quality students, effective faculty, and alumni committed to mentoring students are hallmarks of this program, which is celebrating its 52nd year and again ranked as one of the top five health care administration programs in the country. For more information, call 1-877-MHA-UofM or 612-624-9588, or e-mail mnerney@csom.umn.edu.

Master of Business Taxation (M.B.T.)

This degree program helps students acquire a conceptual understanding of taxation and develop technical competence in applying taxation rules in business and personal decision making.

The program is offered only in the evening through the College of Continuing Education. Students enrolled part-time can expect to complete the program in about two to three years; those enrolled full-time can complete the program in a shorter period of time.

For more information, contact the Director of Graduate Studies in Taxation, 3-108 Carlson School of Management, 321 19th Avenue S., Minneapolis, MN 55455 (612-624-7511).

Doctor of Philosophy in Business Administration

Details about admission and degree requirements for the Ph.D. program in business administration are explained in the *Graduate School Catalog* and in the Ph.D. program brochure available from 4-201 Carlson School of Management, 321 19th Avenue S., Minneapolis, MN 55455 (612-624-0875, fax 612-624-5065).

Master of Arts in Human Resources and Industrial Relations

The M.A. degree program prepares students for professional employment in industrial relations and human resources management in business, government, and labor organizations. The program also serves as preparation for further graduate work in industrial relations or in related fields of study. The degree is offered through full-time day and part-time evening programs.

Candidates for this program are selected on the basis of demonstrated interest and aptitude in industrial relations and the quality of their undergraduate work. A social sciences background is desirable. Students must have completed or be close to completing coursework prerequisite to courses selected for their graduate program.

Nearly one out of every four graduates of the Carlson School holds the title of vice president or above.

Carlson's undergraduate business program is routinely ranked in the top 10 of public 4-year business school programs.

Doctor of Philosophy in Industrial Relations
Details about admission and degree requirements as well as applications for the Ph.D. program in industrial relations can be obtained from the Director of Graduate Studies in Industrial Relations, 3-300 Carlson School of Management, 321 19th Avenue S., Minneapolis, MN 55455 (612-624-2500).

Scholastic Standards and Policies

Academic Progress Standards for Carlson Students
The academic progress of Carlson freshmen is monitored through required semester advising appointments. Because there are GPA criteria for students to matriculate from their freshman to sophomore year, and for students to graduate from the program, any student not making satisfactory academic progress is contacted by a CSOM adviser to develop a plan of action. A copy of the plan is placed in the student's file.

Major Program Matriculation Standards for Carlson Students
For a Carlson freshman to matriculate to the sophomore year, the following standards apply:

- Attendance at all required freshman-year advising appointments
- Completion of 30 credits
- Completion of microeconomics, macroeconomics, and calculus, all with a minimum grade of C-
- Completion of information technology module
- 3.00 overall GPA

Declaring a Major
Students should declare their major once they have earned at least 50 semester credits. To declare a major, students should complete the *Major/Minor Declaration* form available in the Undergraduate Studies Office, 1-105 Carlson School of Management.

Grading Options
Carlson students must earn a minimum of 90 A-F credits. All coursework applied toward the major must be taken on the A-F grading basis.

Incompletes
Students may request a grade of incomplete when they have an emergency or extenuating circumstance that prevents them from completing one or two assignments or a final examination within the normal time frame. Students should work out the details of completing the coursework with the instructor prior to the end of the term, and must complete the work within a year. Incompletes are not awarded to students who are seeking more time to master course material in order to improve their grade. Students are not permitted to sit through a later section of a Carlson School course, or any portion of it, as a means of completing an incomplete. An incomplete changes to an F on the student's transcript 365 days after the end of the term in which the incomplete was given.

Alternative Registrations
V Registration (auditing)—V registration requests for CSOM courses are considered the first day following day school alphabetical registration each semester and are only approved if the course is not full. Students may not apply credits earned in audited coursework to their degree.

Proficiency Examinations
If students have taken an upper division course in marketing (from an institution not accredited by the American Assembly of Collegiate Schools of Business), they may take a proficiency examination to see if they are exempt from taking Mktg 3001—Principles of Marketing. Examinations are offered each semester. Contact the Undergraduate Studies Office at 612-624-3313 for detailed information.

Students who complete their introductory accounting courses at another institution, or who earn less than a B- in Acct 2050, and who wish to continue on in Acct 5101, must take the Acct 5101 pre-test. The test is offered each semester. Contact the Undergraduate Studies Office at 612-624-3313 for detailed information.

Petitions
Petition forms, available in the Undergraduate Studies Office, must be used to determine whether certain courses completed at other institutions are equivalent to University of Minnesota courses and to request exceptions to rules and requirements.

The Scholastic Committee may require students to supply written recommendation from the department or instructors involved. Students should submit the completed petition to the Undergraduate Studies Office, 1-105 Carlson School of Management, and may pick up a response to the request in that office after official action has been taken.

Leave of Absence
Students planning to leave school for more than one semester should contact an adviser in the Undergraduate Studies Office and request to be placed on a temporary leave of absence. Undergraduates who have not been granted a leave of absence and who do not register for two consecutive semesters (excluding summer session) are placed on "discontinued" status and need to contact the Undergraduate Studies Office for approval to return.

Graduation Requirements

To graduate from the Carlson School students must

- complete the University of Minnesota liberal education requirements.
- complete a minimum of 120 credits. These credits include the required tool courses, liberal education requirements, and major requirements.
- complete a minimum of 60 credits in nonbusiness coursework. This includes courses taken before and after admission to the major program.
- complete a minimum of 24 credits of upper division courses taught by Carlson departments *after* official admission to the upper division major.
- complete the final 30 credits of the degree program at the University of Minnesota. (With prior approval, students may apply credits earned at an institution participating in the National Student Exchange Program and through foreign studies programs toward these 30 credits.) In addition, accounting students must complete 50 percent of their total number of accounting credits at the University of Minnesota.
- earn a C- or higher in all major coursework. Major coursework includes the tool courses and all upper division business coursework applied toward the major or minor.
- be in good academic standing with a minimum GPA of 2.00 in all work taken at the University of Minnesota.

Students admitted to an upper division major before fall 1999 should contact an adviser in the Undergraduate Studies Office to discuss semester-transition requirements.

Advising

CSOM offers centralized advising services to undergraduates currently enrolled or interested in its programs.

Transfer students may meet with an adviser on a walk-in basis during office hours, Monday through Friday, to discuss admission requirements.

Students enrolled in the Carlson School may schedule an appointment with a professional academic adviser by calling 612-624-3313 or coming in to 1-105 Carlson School of Management. The Carlson adviser will help design and implement a graduation plan to achieve students' educational goals. Students should prepare for the appointment by giving careful thought to possible course selections, program schedules, and short- and long-term educational and career goals. Freshmen in the Carlson School are required to meet with their adviser each semester during their first year. Students are encouraged to meet with an adviser on a regular basis following their freshmen year.

Upperclassmen are available to serve as "Carlson Buddies" to freshmen and transfer students, a program sponsored by the Undergraduate Business Board.

Special Learning Opportunities and Resources

Honors Emerging Leadership Program—This program promotes the interests of Carlson high-ability students by providing a framework for developing skills in leadership, community service, diversity, and career development. Honors students have access to lower division honors courses at the University. The program is premised on the belief that, in addition to achieving excellent academic records, honors students should provide leadership and support for activities outside the classroom that foster intellectual and personal growth. The program is open to all admitted freshmen with ACT composite scores of 28 or higher, or high school class ranks in the 90th percentile and above. Transfer students with a 3.50 GPA or higher are also invited to join.

Mentorship Program—The Carlson School of Management Undergraduate Mentorship Program matches students with alumni and other successful representatives from the Twin Cities business community. The mentorship program allows students to clarify their interests as they explore career options and increase their understanding of the world of business. Mentors can help students develop their résumés, improve their interviewing and communication skills, and expand their knowledge of business practices.

Accounting Internships—Two opportunities are available within the accounting program to earn academic credit for internships.

Acct 3199—Internship in Public Accounting

Acct 3299—Internship in Management Accounting

The accounting internships must involve full-time work and ideally should provide an opportunity to apply accounting concepts and methods and gain experience that can help in making career decisions. The public accounting internships typically emphasize auditing and taxation. The management accounting internships typically involve work in areas such as developing cost data for specific projects, reviewing accounting procedures, and evaluating/operating some phase of an accounting system.

Office of Information Technology (L-119 Carlson School of Management, 612-625-5550)—The Carlson School's Office of Information Technology provides a variety of services and programs to Carlson students, faculty, and staff. Workshops on basic computing skills, including the use of word processing, spreadsheet, electronic mail, and database systems, are offered on a regular basis. Equipment may be loaned to students for classroom presentations. The office also maintains an extensive set of free "how-to" materials.

Computer Labs (Distributed Computing Services, 612-625-0200)—A CSOM Undergraduate Computer Lab is located in L-108 Carlson School of Management. Additional public computing labs on the West Bank are in 455 Blegen Hall and 50 Hubert H. Humphrey Center. The labs offer free access to PC and Macintosh computers.

Industrial Relations Reference Room (280 Hubert H. Humphrey Center, 612-624-7011)—A division of the Industrial Relations Center, this specialized library maintains a unique collection of resource materials covering all aspects of employment, with an emphasis on collective bargaining and human resource management.

O. Meredith Wilson Library (612-624-0303)—If beginning research on a business subject, students should start in the Business Reference Service located in the basement of the library. Its collection includes reference materials, tax and investment advisory services, periodical indexes, and a large collection of corporate annual reports. Many 10-K reports, which publicly-held corporations must file with the Securities and Exchange Commission, are available on microfiche. The Tax Research Room is adjacent to the Business Reference Service in the southeast alcove of the basement. It contains reference materials on tax services, tax cases, revenue rulings, and tax proceedings.

Periodicals are kept in the Periodicals Room in the basement, but students may also find some newspaper and periodical indexes of interest in the Reference Room on the first floor.

Census and government agency publications are kept in the Government Publications Library in the basement. Indexes, bibliographies, and reference assistance are also available there.

Scholarships

A variety of scholarships—both need- and merit-based—are available for current and prospective Carlson students. The priority deadline for most freshman scholarships is January 15. Applications are available from the Office of Admissions, 240 Williamson Hall (612-625-2008). Information on scholarships for continuing CSOM students is generally available in March. Applications are available from the Undergraduate Studies Office.

International Programs

The Carlson School is committed to preparing its students to be leaders in the global marketplace, armed not only with top managerial skills, but also cross-cultural abilities and understanding. Students are strongly encouraged to incorporate a study abroad experience into their program of study.

More than 200 business professionals mentor Carlson School undergraduates, allowing students to network and make valuable contacts in the business world as early as their freshman year.

The Carlson School offers semester-length exchange programs in Austria, France, Italy, The Netherlands, New Zealand, Norway, and Singapore. Short-term programs are also available in Lyon, France; Vienna, Austria; and Costa Rica. Details about the programs are available in the Carlson School International Programs Office, 4-104 Carlson School.

Students may also choose to participate in study abroad programs sponsored through the University of Minnesota's Global Campus. With careful planning, students can generally apply credits earned abroad toward their degree program.

Career Information

Through the Business Career Center (1-110 Carlson School of Management, 612-624-0011) CSOM students and alumni can investigate local and nationwide career opportunities, receive help with résumés and interviewing skills, and obtain information about companies throughout the United States. The Center provides a wide range of workshops to help students in their career search and develop their professional image. The center is the place to start searching for an internship or permanent job. The centerpiece of searching for these jobs is the Center's proprietary Carlson Automated Recruiting System (CARS). This automated system lists hundreds of positions with companies and opportunities to interview on and off campus with recruiters eager to hire Carlson School students.

Student Organizations

Actuarial Club—This club is made up of students from all colleges who are interested in actuarial science. The group sponsors guest speakers, company tours, social events, and a mentorship program.

Alpha Kappa Psi—This coeducational, national business fraternity brings together students with a common interest in business for scholastic and social activities. Prominent men and women in business are featured at meetings throughout the year. Members participate in tours, seminars, and community service projects. Meetings are held Sunday evenings at the chapter house, 1116 Fifth Street S.E., Minneapolis. Visitors are welcome.

American Marketing Association (AMA)—AMA is a nonprofit, student-run organization that promotes a better understanding of marketing and its role in the business world. AMA provides opportunities to hear area business leaders speak on current marketing issues, tour area firms, and make valuable business contacts.

Beta Alpha Psi—This national, professional honorary organization introduces the aspiring accountant to the business world by encouraging interaction among students, faculty, alumni, and area business people. The organization offers students the opportunity to meet professionals in the field and learn about career alternatives in accounting through special professional programs.

Beta Gamma Sigma—Membership in Beta Gamma Sigma is the highest national recognition a student can receive in an undergraduate or master's program in business or management. Beta Gamma Sigma encourages and rewards scholarship, promotes advancement of education in business, and fosters integrity in the conduct of business operations. To be eligible for membership students must rank in the upper 7 percent of their junior class, upper 10 percent of their graduating senior class, or upper 20 percent of their graduating master's class. Members are elected to membership and publicly recognized during spring semester.

Business Association of Minorities (BAM)—
This organization, made up of management and premanagement students, fosters a multiethnic sharing of ideas and concerns among people interested in the role people of color play in today's business world. Through a variety of activities, BAM brings together people who are interested in meeting the academic, political, and social needs of minority students pursuing a Carlson degree. Tours of local corporations, guest speakers, and social events are sponsored by BAM throughout the year. Members are actively involved in various campus and community activities.

Business Board (B-Board)—This group represents CSOM's undergraduate student body. B-Board sets policies that govern student organizations and its members serve on various school committees and plan activities to foster interaction among students and faculty. Non-board members are welcome to participate in all B-Board meetings and events.

Club MIS—Club MIS is a student organization that offers opportunities to learn about the MIS industry and the companies within it. Company representatives are invited to present at meetings, offering students a great opportunity to network and learn about future internships or job opportunities. Club MIS also sponsors a variety of social activities, such as intramural teams, barbecues, dinners, and an annual ski-trip.

Delta Sigma Pi—This business fraternity for men and women offers professional events such as tours of local businesses, dinners, and guest speakers. Members can also participate in community service activities, intramural athletics, and social events. Meetings are held Monday evenings in the Undergraduate Student Lounge, 1-112 Carlson School of Management.

Entrepreneurship Club—The Entrepreneurship Club is dedicated to teaching students how to become financially independent and become successful entrepreneurs. Weekly meetings are held to network with small business owners, presidents/CEO's, venture capitalists, restaurant/café owners, home business owners, bankers, investors, real estate investors, tax accountants, finance specialists, authors, and local leaders.

Honors Emerging Leadership Program—See Special Learning Opportunities and Resources.

GLOBE—GLOBE provides a means for Carlson students, faculty, and staff interested in international business to learn about the topic through monthly speakers and various cultural activities. Globe's mission is to promote international activities that integrate Carlson School students, community leaders, faculty, and staff for greater educational and social opportunities.

Phi Beta Lamba—This organization is the collegiate version of Future Business Leaders. It provides students interested in business-related careers the opportunity to sharpen their communication, leadership, and analytical skills through a series of local and national competitions. The organization is open to all University students and seeks participation particularly from freshmen and sophomores.

Society for the Advancement of Management (SAM)—This organization welcomes all Carlson School of Management students interested in becoming involved in the business community. Members learn practical business techniques by interacting with practicing professionals and other students.

Student Association for Accounting (SAFA)—Students seeking to meet other accounting students, faculty, and professionals compose SAFA's membership. To ease each student's shift from college to the business world, SAFA arranges office tours and on-campus lectures every semester. Each fall, SAFA and B-Board cosponsor the Career Fair. SAFA also hosts an annual spring banquet for students, faculty, and many accounting representatives.

The Student Association for Nonprofit Enterprise (SANE)—This organization is dedicated to increasing nonprofit business awareness through interactions with the community and the University. SANE's mission is to give University students and members the opportunity to give back to the community through volunteer services and to help CSOM integrate a nonprofit focus into the undergraduate program.

Society for Human Resource Management (SHRM)—The SHRM student program has been created to promote mutually beneficial interaction between HR students and practitioners. Membership offers students the opportunity to supplement their classroom experiences with real-world knowledge and hands on experiences.

The Investment and Finance Organization (InFO)—This organization is open to all students who wish to meet professionals within various areas of the financial industry. Speakers from investing and finance companies give their valuable insight into career paths. InFO also sponsors social events to help students with similar interests become acquainted. Weekly meetings involve in-depth discussions about the stock market, investing, bonds, commodities, and financial planning.

Directory

(area code 612)

Accounting and Business Law
3-122 Carlson School of Management
624-6506

Business Career Center
1-110 Carlson School of Management
624-0011

Carlson Evening MBA Program
4-106 Carlson School of Management
626-7900

Carlson Executive M.B.A. Program
4-106 Carlson School of Management
624-1385

Executive Development Center
2-250 Carlson School of Management
624-2545

Finance
3-122 Carlson School of Management
624-2888

Healthcare Management
3-150 Carlson School of Management
624-8818

> ***Center for the Study of Healthcare Management***
> 4-151 Carlson School of Management
> 624-1532

Human Resources and Industrial Relations & Industrial Relations Center (IRC)
3-300 Carlson School of Management
624-2500 (graduate programs, 624-5810)

> ***Employer Education Service***
> 624-5525
>
> ***I.R. Reference Room***
> 624-7011
>
> ***Labor Education Service***
> 624-5020

Information and Decision Sciences
3-365 Carlson School of Management
624-8030

> ***Management and Information Systems Research Center***
> 3-306 Carlson School of Management
> 624-6565

Juran Center for Leadership in Quality
3-306 Carlson School of Management
624-6565

Managerial Communication Center
1-150S Carlson School of Management
624-1525

Marketing and Logistics Management
3-150 Carlson School of Management
624-5055

> ***Center for Entrepreneurial Studies***
> 3-306 Carlson School of Management
> 624-3838

M.B.A. Program (full time)
2-210 Carlson School of Management
624-0006

M.B.T. Program
3-108 Carlson School of Management
624-7511

M.S.-M.O.T. Program
107 Lind Hall
624-5747

Office of the Dean
4-300 Carlson School of Management
626-9636

> ***Advancement***
> 626-9636
>
> ***Communications***
> 626-7756
>
> ***Financial Services***
> 626-9382
>
> ***Human Resources***
> 626-9636
>
> ***International Programs***
> 4-104 Carlson School of Management
> 625-9361
>
> ***Office of Information Technology***
> L-119 Carlson School of Management
> 625-5550
>
> ***Physical Resources***
> 624-5567

Operations and Management Sciences
3-150 Carlson School of Management
624-7010

Ph.D. Program
4-201 Carlson School of Management
624-0875

Strategic Management and Organization
3-365 Carlson School of Management
624-5232

> ***Strategic Management Research Center***
> 3-306 Carlson School of Management
> 624-0226

Undergraduate Program
1-105 Carlson School of Management
624-3313

Mailing Address
Undergraduate Studies Office
Carlson School of Management
University of Minnesota
1-105 Carlson School of Management
321 19th Avenue S.
Minneapolis, MN 55455-0430
624-3313

Fax: 624-0350
Web: <www.carlsonschool.umn.edu>

During the 2000-2001 school year, over 100 companies came to the CSOM Career Services Center to interview students. The average starting salary of B.S.B. graduates is about $42,000.

Carlson School of Management

Degree Programs and Minors

All Programs

The following requirements apply to all Carlson degree programs.

Lower Division Requirements

Tool Courses (A-F only)

Microeconomics (Econ 1101) (4 cr)
Macroeconomics (Econ 1102) (4 cr)
Calculus (Math 1142 [4 cr] or Math 1271 [4 cr] or equivalent)
Business statistics (OMS 1550 [4 cr] or acceptable statistics course)
Principles of accounting (Acct 2050) (4 cr)

Other Requirements

Freshman writing (EngC 1011, 1012, 1013, or 1014) (4 cr, A-F only)
General psychology (Psy 1001 or equivalent) (4 cr, A-F only)
Information technology module (BA 1001) (1 cr, S-N only)
(required for students admitted as freshmen only and recommended for others who need additional background with technology)
Career Skills (BA 3000) (1 cr, A-F only)
University of Minnesota liberal education requirements (see page 31)

Upper Division Requirements

A. Functional core (3 cr each, A-F only)
Acct 3001—Introduction to Management Accounting
Fina 3001—Finance Fundamentals
HRIR 3021—Personnel and Industrial Relations
IDSc 3001—Information Systems and Information Management
Mgmt 3001—Fundamentals of Management
Mktg 3001—Principles of Marketing
OMS 3001—Introduction to Operations Management
B. Communication core (3 cr, A-F only)
BA 3033W—Business Communication
C. International core (3 cr, A-F only)
Mgmt 3040—International Environment of Business
D. Mgmt 4004W—Business Policy: Strategy Formulation and Implementation (3 cr, A-F only)
E. Major coursework—16-24 cr

Accounting

Department of Accounting

B.S.B.

Accounting is the process of gathering financial information and presenting it in a manner that will help others make better decisions. Accountants also are frequently called upon to analyze financial information and provide important business advice. The terms and definitions that have emerged from the discipline of accounting are used widely within industry. In fact, accounting is commonly described as the "language of business."

With increased automation over the years, the role of accountants has changed dramatically. Accountants have become recognized as valued business advisers and important members of an organization's management team.

The major areas of study within the accounting curriculum are financial accounting, management accounting, income taxation, auditing, and business law.

Required Courses

Acct 5101—Intermediate Accounting I (4 cr)
Acct 5102—Intermediate Accounting II (4 cr)
Acct 5125—Auditing Principles and Procedures (4 cr)
Acct 5135—Fundamentals of Federal Income Tax (4 cr)
Acct 3201—Intermediate Management Accounting (2 cr)
BLaw 3058—The Law of Contracts and Agency (4 cr)

Two credits from the following:

Acct 5126—Internal Auditing (2 cr)
Acct 5160—Financial Statement Analysis (2 cr)
Acct 5180—Consolidations and Advanced Reporting (2 cr)
Acct 5236—Introduction to Taxation of Business (2 cr)
Acct 5271—Accounting Information Systems (2 cr)
Acct 5310—International Accounting (2 cr)
Acct 5320—Current Topics in Accounting (2 cr)

Accounting Minor

Requirements

Acct 5101—Intermediate Accounting I (4 cr)
Acct 5102—Intermediate Accounting II (4 cr)

Plus 4 credits chosen from the following:

Acct 3201—Intermediate Management Accounting (2 cr)
Acct 5160—Financial Statement Analysis (2 cr)
Acct 5135—Fundamentals of Federal Income Tax (4 cr)
Acct 5180—Consolidations and Advanced Reporting (2 cr)
Acct 5310—International Accounting (2 cr)

Actuarial Science

Department of Human Resources and Industrial Relations

B.S.B.

Actuarial science applies mathematics to insurance problems. Practicing actuaries calculate insurance premiums, policy and loss reserves (liabilities), and estimate costs of future losses.

Students are introduced to professional organizations, including The Society of Actuaries, American Academy of Actuaries, Casualty Actuarial Society, Conference of Consulting Actuaries, and American Society of Pension Actuaries. Students typically take at least two professional actuarial examinations before graduation.

There are multiple career opportunities for students with the mathematics, business, and communication skills developed through the actuarial science major. The insurance and actuarial community strongly supports this program.

Required Courses

Required prerequisite courses include differential and integral calculus: Math 1271, 1272, 2243, 2263
Four credits from: Ins 5100, 5101, 5200, 5201 (2 cr each)
Math 4065—Theory of Interest (3 cr)
Math 5067 and 5068—Actuarial Math I and II (4 cr each)
Stat 5101 and 5102—Theory of Statistics I and II (4 cr each)
or Math 5651—Basic Theory of Probability and Statistics (4 cr)

and Math 5652—Introduction to Stochastic Processes (4 cr)
or Stat 4101 and 4102—Theory of Statistics I and II (4 cr each) (this sequence acceptable only if students also complete a probability course)

Actuarial Science Minor

Math 4065—Theory of Interest (3 cr)
Math 5067—Actuarial Mathematics I (4 cr)
Math 5068—Actuarial Mathematics II (4 cr)

Plus four credits from two of the following:
Ins 5100—Corporate Risk Management (2 cr)
Ins 5101—Employee Benefits and Pensions (2 cr)
Ins 5200—Insurance Theory and Practice (2 cr)
Ins 5201—Personal Financial Management (2 cr)

Finance

Department of Finance

B.S.B.

The finance major develops students' understanding of principles and techniques of effective financial decision making. It provides students with the skills and knowledge required to assist businesses, governments, or individuals in answering questions regarding raising funds, making investments, evaluating performance, and distributing profits.

Required Courses

Acct 5100—Corporate Financial Reporting (4 cr)
Fina 4241—Corporate Financing Decisions (4 cr)

Twelve credits of finance coursework from the following:
Acct 5160—Financial Statement Analysis (2 cr)
Fina 4121—Financial Markets and Interest Rates (2 cr)
Fina 4122—Banking Institutions (2 cr)
Fina 4242—Corporate Investment Decisions (4 cr)
Fina 4321—Portfolio Management and Performance Evaluation (2 cr)
Fina 4322—Security Analysis (2 cr)
Fina 4541—Futures, Options, and Other Derivative Securities (4 cr)
Fina 4641—International Finance and Risk Management (4 cr)

Finance Minor

Fina 4241—Corporate Financing Decisions (4 cr)
Plus 8 credits from the finance/accounting courses listed above.

General Management

B.S.B.

Degree Requirements

The general management major is intended for students who wish to develop an area of expertise outside of the major programs offered by the Carlson School. Students who pursue this major should have a particular career goal or objective in mind that can be best addressed through a self-designed program of study.

General Management—Entrepreneurial Studies

B.S.B.

Businesses, large and small, are coming to understand a new environment of rapid change. They are being challenged to take advantage of new markets and greater demands on current products. Their ability to adapt to a rapidly changing environment can yield great rewards, but it requires multifunctional and multitasking individuals able to form and develop new businesses and comfortably exist within a sea of change.

The general management major with an emphasis in entrepreneurial studies provides current and future business professionals with the necessary skills and tools to successfully form and develop businesses and function as entrepreneurs or as productive members of entrepreneurial, emerging or aggressively-positioned companies. These organizations require individuals that have the ability to manage risk, multitask across functional boundaries, and creatively engage and adapt to an environment that is constantly changing.

Required Courses

Acct 5100—Corporate Financial Reporting (4 cr)
Mgmt 5177—The Business Plan (2 cr)
Mgmt 4008—Entrepreneurial Management (4 cr)

Ten credits from the following electives:
Fina 4241—Corporate Financing Decisions (4 cr)
or Fina 4242—Corporate Investment Decisions (4 cr)
or Fina 4641—International Finance and Risk Management (4 cr)
HRIR 3031—Staffing and Selection (2 cr)
Ins 5100—Corporate Risk Management (2 cr)
Mgmt 4002—Managerial Psychology (4 cr)
Mgmt 5050—Management of Innovation and Change (2 cr)
Mktg 3010—Marketing Research (4 cr)
or Mktg 4050—Integrated Marketing Communications (4 cr)
OMS 3041—Project Management (2 cr)

General Management—Entrepreneurial Studies Minor

Acct 5100—Corporate Financial Reporting (4 cr)
Mgmt 4008—Entrepreneurial Management (4 cr)
Mgmt 5177—The Business Plan (2 cr)
Plus two credits from the electives listed in the major above.

The faculty at the Carlson School were recently ranked # 7 for research among business schools by the Academy of Management.

Human Resources and Industrial Relations

Department of Human Resources and Industrial Relations

B.S.B.

The human resources and industrial relations (HRIR) major prepares graduates for positions involving the recruitment and/or selection of new employees, identification of training needs among new and current workers, the functional operation of compensation systems and benefits packages, and the management of employee relations programs where workers are represented by trade unions. Human resource specialists have progressed from record keepers to strategic partners in the areas of finance and marketing as organizations recognize the importance of qualified people to their success. Today businesses compete as much based on human capital as they do on physical capital.

Required Courses

Choose 16 credits from the following:

HRIR 3024—Governing the Workplace: Comparative Perspectives (2 cr)
HRIR 3031—Staffing and Selection: Strategic and Operational Concerns (2 cr)
HRIR 3032—Training and Development (2 cr)
HRIR 3041—The Individual in the Organization (2 cr)
HRIR 3042—The Individual and Organizational Performance (2 cr)
HRIR 3051—Compensation: Theory and Practice (2 cr)
HRIR 3071—Union Organizing and Labor Relations (2 cr)
HRIR 3072—Collective Bargaining and Dispute Resolution (2 cr)
HRIR 5021—Systems of Conflict and Dispute Resolution (4 cr)
HRIR 5022—Managing Diversity (2 cr)
HRIR 5023—Personnel and Industrial Relations Law (2 cr)
HRIR 5024—Employee Performance: Appraisal and Management (2 cr)
HRIR 5025—Comparative and International Human Resources and Industrial Relations (2 cr)
HRIR 5061—Public Policies on Work and Pay (3 cr)
Ins 5101—Employee Benefits and Pensions (2 cr)

Human Resources and Industrial Relations Minor

Choose 8 credits from the courses listed above.

International Business

B.S.B.

Carlson's international mission is "to ensure that its faculty and students obtain the necessary understanding of and appreciation for the impact of a global economy on the teaching and practice of management...." The major in international business follows this mission and allows students to combine study abroad experience(s) with coursework in international business and economics, and language.

Required Courses

Fina 4641—International Finance (4 cr)
or Acct 5310—International Accounting (2 cr)
Mktg 4070—International Marketing (2 cr)
or Mgmt 4005—Managing the Multinational Business (4 cr)
Proficiency in a language other than English at the level of four college semesters (two years).
An approved study abroad experience of at least one quarter (semester strongly recommended; summer programs do not meet this requirement), during which the student completes at least 8 semester credits of business (or related area) coursework is required for the major.
Sufficient credits in international business (or related area) for a minimum credit total of 20 semester credits.

Students work closely with an adviser to design their program of study.

International Business Minor

Fina 4641—International Finance (4 cr)
or Acct 5310—International Accounting (2 cr)
Mktg 4070—International Marketing (2 cr)
or Mgmt 4005—Managing the Multinational Business (4 cr)
An approved study abroad experience of any length during which the student completes at least 4 semester credits of business or related coursework.
Sufficient credits in international business for a minimum of 12 credits
Proficiency in a language other than English at the level of four college semesters (two years).

Management Information Systems

Department of Information and Decision Sciences

B.S.B.

The management information systems (MIS) major prepares students to be leaders in conceptualizing, prescribing, developing, and delivering leading-edge information system applications that support business processes and management decision making. It provides students with an understanding of the functions of information systems in organizations and detailed knowledge of information system analysis, design, and operation.

Degree Requirements

Students in the major complete 20 credits of MIS courses in addition to IDSc 3001. Sixteen of these credits are required and cover topics dealing with application and development, business process analysis and design, project management, and information technology infrastructure. For the remaining 4 credits, students select from a pool of MIS elective courses.

Fundamental to success in performing MIS work is an understanding of human behavior and computer technology. Therefore, MIS majors are encouraged to take courses in psychology, sociology, and computer science as part of their overall undergraduate degree requirements.

Required Courses

IDSc 3201—Introduction to Programming for Systems Development (4 cr) (course approval pending)
IDSc 3202—Analysis and Modeling for Business Systems Development (4 cr) (course approval pending)

IDSc 4203—Information Technology Infrastructure (4 cr)
IDSc 4204—Information Services Management (2 cr)

Four credits from the following:
IDSc 4421—Financial Information Systems and Technologies (2 cr)
IDSc 4431—Advanced Database Design (2 cr)
IDSc 4432—Advanced Database Management and Administration (2 cr)
IDSc 4441—Electronic Commerce (2 cr)
IDSc 4461—Data Warehousing (2 cr) (course approval pending)
IDSc 4490—Information Systems Special Topics (2 cr)
IDSc 4496—Information Systems Industry Internship (2 cr)

Marketing

Department of Marketing and Logistics Management

B.S.B.

Marketing is concerned with the flow of goods and services through the economy and the distribution of both industrial and consumer goods. Because more than one half of the consumer dollar goes to pay for marketing services, marketing is a significant part of the economy, and the efficiency with which marketing activities are carried out has major social and economic implications.

Required Courses

Mktg 3010—Marketing Research (4 cr)

Sixteen credits from the following:
Mktg 4020—Advanced Logistics and Supply Chain Management (2 cr)
Mktg 4030—Selling and Sales Management (4 cr)
Mktg 4040—Buyer Behavior (4 cr)
Mktg 4050—Integrated Marketing Communications (4 cr)
Mktg 4060—Marketing and Distribution Channels (4 cr)
Mktg 4070—International Marketing (2 cr)
Mktg 4080—Marketing Strategy (4 cr)
Mktg 4090—Marketing Topics (2 cr)

Marketing Minor

Mktg 3010—Marketing Research (4 cr)
8 additional credits chosen from the marketing courses listed above.

Risk Management and Insurance

Department of Human Resources and Industrial Relations

B.S.B.

Risk management is the practice of identifying the risks that affect a company's business and finding ways to mitigate and offset those risks. Risk management tools and techniques help corporations deal with all types of issues, legal concerns, and human resources changes.

This major introduces students to the risk management discipline and multiple career paths, including corporate risk manager, benefits manager, insurance agent/broker, underwriter, loss adjuster, consultant, and personal financial planner.

Required Courses

Ins 5100—Corporate Risk Management (2 cr)
Ins 5101—Employee Benefits and Pensions (2 cr)
Ins 5200—Insurance Theory and Practice (2 cr)
Ins 5201—Personal Financial Management (2 cr)

Three to four credits from the following:
BLaw 3058—The Law of Contracts and Agency (4 cr)
Fina 4241—Corporate Financing Decisions (4 cr)
Fina 4242—Corporate Investment Decisions (4 cr)
Math 4065—Theory of Interest (3 cr)
Math 5067—Actuarial Mathematics I (4 cr)
Math 5068—Actuarial Mathematics II (4 cr)

Risk Management and Insurance Minor

Ins 5100—Corporate Risk Management (2 cr)
Ins 5101—Employee Benefits and Pensions (2 cr)
Ins 5200—Insurance Theory and Practice (2 cr)

One of the following six courses:
BLaw 3058—The Law of Contracts and Agency (4 cr)
Fina 4241—Corporate Financing Decisions (4 cr)
Ins 5201—Personal Financial Management (2 cr)
Math 4065—Theory of Interest Rates (3 cr)
Math 5067—Actuarial Mathematics I (4 cr)
Math 5068—Actuarial Mathematics II (4 cr)

Supply Chain Management

Department of Marketing and Logistics Management

B.S.B.

Supply chain management manages the flow of goods, information, and services in order to deliver maximum value to the consumer while minimizing the costs of the flow. It is an integrative process across functions within a firm and between trading partners. It is also considered an essential strategy for product-oriented firms as they seek competitive advantage.

Required Courses

IDSc 3202—Analytical Skills for Business Application Development (4 cr)
IDSc 4441—Electronic Commerce (2 cr)
Mktg 4060—Marketing and Distribution Channels (4 cr)
OMS 3056—Managing Supply Chain Operations (4 cr)

Plus 6 additional credits chosen from the following:
IDSc 4204—Information Services Management (2 cr)
Mktg 4020—Advanced Logistics and Supply Chain Management (2 cr)
Mktg 4030—Selling and Sales Management (4 cr)
Mktg 4070—International Marketing (2 cr)
OMS 3041—Project Management (2 cr)
OMS 3059—Quality Management and Six Sigma (4 cr)

General Management

Interdisciplinary

Minor Only

A general management minor is open to students enrolled in other colleges at the University of Minnesota, Twin Cities.

Prerequisite Courses

Econ 1101—Microeconomics
Math 1031—College Algebra
or other advanced math course
OMS 1550—Business Statistics

Required Courses

Acct 2050—Principles of Accounting

Choose 12 credits from the following:
Acct 3001—Introduction to Management Accounting (3 cr)
Fina 3001—Finance Fundamentals (3 cr)
HRIR 3021—Personnel and Industrial Relations (3 cr)
IDSc 3001—Information Systems and Information Management (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Mktg 3001—Principles of Marketing (3 cr)
OMS 3001—Introduction to Operations Management (3 cr)

Students should apply for admission to the minor after completing the prerequisite courses.

The management minor curriculum is under review and was not finalized before the printing of this catalog. Please contact the Undergraduate Studies Office in 1-105 CarlSMgmt for more information.

The management of information systems as an academic discipline was founded at the Carlson School and continues to be ranked as one of the best programs in the country.

This is the Medical Technology section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Medical Technology

Degree Program


CWHK 10X/18L

Medical Technology

General Information

The medical technology program (also called clinical laboratory science) was established at the University of Minnesota in 1922 to prepare men and women for professional work in laboratory science and advanced study. This program provides a strong foundation in the sciences together with rich experiences in the clinical laboratory. Approximately 20 percent of medical technology graduates go on to complete an advanced degree.

Clinical laboratory scientists (medical technologists) perform many and varied laboratory analyses and use critical thinking in determining the correctness of test results. They recognize the interdependency of testing information and have knowledge of physiologic and pathologic conditions affecting results in order to validate them. In many health care settings, they provide data used by physicians in determining the presence, extent, and, as far as possible, causes of disease.

Clinical laboratory scientists/medical technologists

- develop and establish procedures for collecting, processing, and analyzing biological specimens and other substances;
- perform analytical tests of body fluids, blood, serum, plasma, cells, and other substances.
- integrate and relate data generated by various clinical laboratories while making decisions regarding possible discrepancies.
- confirm abnormal results, verify and execute quality control procedures, and solve problems concerning the generation of laboratory data.
- make decisions concerning the results of quality control and quality assurance measures and institute proper procedures to maintain accuracy and precision.
- establish and perform preventive and corrective maintenance of equipment and instruments as well as identify appropriate sources for repairs.
- develop, evaluate, and select new techniques, instruments, and methods in terms of their usefulness and practicality within the context of a given laboratory's personnel, equipment, space, and budgetary resources.
- demonstrate professional conduct through interpersonal skills with patients, laboratory personnel, other health care professionals, and the public.
- participate in continuing education for growth and maintenance of professional competence.
- provide leadership in educating other health personnel and the community.
- exercise principles of management, safety, and supervision.
- apply principles of educational methodologies.
- use principles of current information systems.

Source: National Accrediting Agency for Clinical Laboratory Sciences, Chicago, Illinois, 1995.

Tests and procedures are performed or supervised by laboratory technologists in hematology, coagulation, microbiology, immunohematology, immunology, clinical chemistry, and urinalysis. Subspecialty areas in which laboratory personnel work include such fields as molecular diagnostics, cytogenetics, fertility testing, flow cytometry, tissue typing, bone and skin banks, forensics, and infection control.

As complexities of clinical laboratories increase, many medical technologists specialize in immunohematology, hematology, microbiology, chemistry, immunology, virology, coagulation, administration, computer science, education, quality assurance, and other areas. There are opportunities for graduates to work in hospital laboratories, clinics, physician offices, public health agencies, research, and industry.

As a general rule, a student who has excelled in scientific subjects in high school will succeed in medical technology.

The program is fully accredited by the National Accrediting Agency for Clinical Laboratory Sciences, 8410 West Bryn Mawr, Suite 670, Chicago, IL 60631 (773-714-8880; e-mail INFO@naacls.org).

Mission Statement

The mission of the Division of Medical Technology is to be a leader in educating clinical laboratory science professionals. In accordance with the University of Minnesota's mission, we strive to do this in an environment that embodies the values of academic freedom, responsibility, integrity, and cooperation; that provides an atmosphere of mutual respect, free from racism, sexism, and other forms of prejudice and intolerance; that assists individuals, institutions, and communities in responding to a continuously changing world; that is conscious of and responsive to the needs of the many communities it is committed to serving; that creates and supports partnerships within the University, with other educational programs, and with communities to achieve common goals; and that inspires, sets high expectations for, and empowers the individuals within its community.

The division pursues this mission through teaching, research, and actively working with the health care community to assist in meeting the clinical laboratory needs of the state of Minnesota. Specifically, the division

- educates students to be clinical laboratory professionals who have the knowledge, skills, and values to provide competent and ethical practice in clinical laboratory science;
- develops new knowledge about the practice of clinical laboratory sciences;
- helps communities and other professionals develop an awareness and understanding of the role of the clinical laboratory professional and the work they perform;
- collaborates with other professionals within the health care community to assess the changing needs of the clinical laboratory, design solutions to meet the challenges, and monitor the quality of laboratory practice; and
- provides continuing education opportunities to practicing clinical laboratory professionals.

Facilities

Health sciences facilities are in a complex of buildings on the East Bank of the Minneapolis campus, including the Mayo Memorial Building, Malcolm Moos Health Sciences Tower, Weaver-Densford Hall, and the Phillips-Wangensteen Building. Close to or connected with the complex are Fairview-University Medical Center, Dwan Variety Club Cardiovascular Research Center, Veterans of Foreign Wars Cancer Research Center, and Children's Rehabilitation Center. Extensive resources and services of the Bio-Medical Library, including the Learning Resources Center, are housed in Diehl Hall.

These facilities provide learning, research, and internship sites for many students. They are excellent research centers, not only for studying diseases, healthy physiological processes, and environmental health, but also for developing new procedures and delivering expert health care. The proximity of the Academic Health Center units to each other and to the rest of the campus facilitates interdepartmental communication and underscores the interdisciplinary nature of health care. The Academic Health Center units also maintain affiliations with many hospitals and health care facilities around the Twin Cities and greater Minnesota, which afford students access to a wide spectrum of health care situations.

Clinical experiences for University of Minnesota medical technology students are available at the Veterans Affairs Medical Center, Allina Laboratories, and Fairview Health Services; Mayo Clinic (Rochester); the North Central Blood Services of St. Paul, Regions Hospital (St. Paul), and HealthEast Hospitals (St. Paul), Park Nicollet Health Services, St. Cloud Hospital (St. Cloud), and Immanuel–St. Joseph's Hospital (Mankato).

Admission

The Division of Medical Technology sets its own standards and requirements for admission. These include a strong background in the natural sciences (specifically biology, chemistry, and physiology), as well as in the social and behavioral sciences. The division recommends that applicants be genuinely interested in human services and sincerely committed to promoting the public's health and general welfare. Students generally enter the program at the beginning of their junior year.

Application Process

The medical technology curriculum consists of the preprofessional program at the University of Minnesota or its equivalent at another regionally accredited institution and the professional program in the Division of Medical Technology, which is part of the Academic Health Center.

Admission to the Preprofessional Program—Students who are applying to enroll in a preprofessional program must meet the admission criteria and follow academic regulations of that college.

The medical technology sequence is based on entrance to the professional program in the fall semester of year three or four, depending on completion of prerequisites.

Admission to the preprofessional program at the University of Minnesota does not assure admission to the professional program.

Admission to the Professional Program—For admission to the Division of Medical Technology, a student must have completed 60 semester credits, including required courses. The major criterion for admission is satisfactory academic performance as judged by the student's grade point average (GPA) in prerequisite courses. Students are admitted once each year for the fall semester. Admission to the professional program is competitive because of the limited number of students who can be accommodated in the teaching and clinical facilities.

Students in residence at the University of Minnesota who expect to complete the requirements for admission to the professional program must file a *Change of College* form with the One Stop Student Services Center, 200 Fraser Hall, by February 1. (Priority deadline is February 1. Applications are accepted until the class is full.) Those who have sufficient credits but have course deficiencies should consult with the Division of Medical Technology adviser regarding their status.

Students from other regionally accredited colleges and universities may transfer to the University of Minnesota to complete the medical technology program. Courses completed that are equivalent to those offered at the University of Minnesota are accepted to satisfy the requirements for admission to the Division of Medical Technology. Students who have a baccalaureate degree in a science curriculum and have completed required courses may finish the program in 15 months, as space is available in affiliated laboratories. Students transferring from other colleges may obtain an *Application for Admission* by requesting a form from the following e-mail address: admissions@tc.umn.edu or from the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455-0213 (612-625-2008 or 800-752-1000). Refer to the admissions Web site <http://admissions.tc.umn.edu> for other information or an online application. Applications must be filed with the Office of Admissions by February 1. It is strongly advised that transfer students ascertain their status by writing to the Adviser, Division of Medical Technology, University of Minnesota, MMC 609, 420 Delaware Street S.E., Minneapolis, MN 55455, so that, if necessary, they may complete required courses during the summer.

English Proficiency—If students are not native speakers of English, they must take the Test of English as a Foreign Language (TOEFL) or the Michigan English Language Assessment Battery (MELAB). To register for the TOEFL, students should contact the agency that handles TOEFL registration in their country or write to the Educational Testing Service (Box 6151, Princeton, NJ 08541, USA) at least 10 weeks before any scheduled test date. If students are already in the Twin Cities area, they may register for the MELAB with the Minnesota English Center, University of Minnesota, 315 Nolte Center for Continuing Education, Minneapolis, MN 55455, or call 612-624-1503. To register for the MELAB outside the Twin Cities area, contact the English Language Institute, Testing and Certification Division, University of

Initiated in 1922, the medical technology program was the first in the nation to offer a baccalaureate degree.

Extended Career Paths in Medical Technology

Hospital/Medical Center: Laboratory Areas		Health Care Administration	Health Care Agency/Government
Acute care Andrology/Fertility testing Blood bank Bone marrow Cell markers Chemistry Coagulation Computer science Components - Transfusion service Cytogenetics Cytodiagnostic urinalysis Cytology/Histology Development laboratory Drug analysis (toxicology) Endocrinology Flow cytometry Forensic science Genetics Hematology Immunology Immunopathology Immunophenotyping Infection control Laboratory supervisor or administrator	Microbiology Molecular diagnostics Mycology Nuclear medicine Out patient or clinic laboratory Parasitology Pathology - Surgical, autopsy Phlebotomy/Specimen processing Platelet studies Photography/Illustration (e.g., in forensic medicine) Quality assurance Serology Skin or bone bank Special stains STAT (emergency) laboratory Tissue typing Transfusion technical specialty Transplant services Urinalysis Virology	Clinic manager/administrator Coder-Abstractor (business or medical records office) Consultant service specialist Personnel director Emergency medical services coordinator Financial manager/planner Group practice administrator Hazardous waste coordinator Health care administrator Health insurance administrator Health policy analyst Health promotion coordinator Hospital quality assurance coordinator Infection control officer Epidemiologist Laboratory supervisor Laboratory director Laboratory utilization review coordinator Long-term care administrator Mental health administrator Purchaser (laboratory/ hospital/medical center) Staffing coordinator (laboratory or home care)	Administrator for Veterans Affairs hospital Biometrist Crime laboratory scientist Department of Health - Educator Department of Health - Proficiency test consultant Employee recruiter/Placement officer Environmental health specialist (inspector) Environmental pathology technologist Fraud investigator Health Management Organization - Health educator JCAHO Survey team member/CAP inspector Medical examiner investigator (e.g., for coroner) Military service - Armed Forces, ROTC, National Guard NASA mission specialist Patient educator Private investigator FBI/Special agent (forensic lab)
Management Information System	**Research - Basic and Applied**	**Industry (U.S. or International)**	
Biometrician Director - Division of Biometry Hospital Information Systems - Team leader Installer/Educator Programmer Systems analyst	Associate scientist/Scientist Clinical trial coordinator Director of research Research analyst Research assistant	Adviser to or inventor of "home" or other lab tests Biomedical specialist - Occupational health Cell culture consultant Clinical trial coordinator Compliance coordinator Computer consultant Director of marketing Documentation supervisor Editor/manager - Medical publications Food technologist - Quality assurance manager Health care reimbursement coordinator Health promotion and education specialist Industrial hygiene specialist Installation specialist	Insurance underwriter Manager-Health claims administration Medical claims reviewer/ Auditor/Insurance processor Medical consultant (TV/Movie industry) Medical fee analyst - Insurance Owner/Director of employee placement service Product specialist Quality control/Quality assurance monitor/Director Research and development technologist or director Research scientist Risk management representative - Insurance Salesperson Technical representative
Other Professional Routes		**Education**	**Humanitarian Work**
Accounting Consultant to physician office laboratories Dentistry Health radiation science Laboratory scientist Law (e.g., patent attorney) Legislature - Politician, lobbyist, regulations writer	Medical Physics/Engineering Medicine Optometry Public health Reference/Independent/ Commercial laboratory scientist Veterinary medicine	Academician Allied health dean/Health sciences administrator Education coordinator or program director Educator of students in clinical settings Faculty member in CLS/CLT/Cyto/SBB program Higher education administrator Instructor in veterinary medicine or other allied health program Medical community services program coordinator	Medical missionary work Peace Corps Project HOPE, others

Michigan, Ann Arbor, MI 48109, USA, or call 734-764-2416. The minimum scores required are 572 for the TOEFL (230 on the computer-based exam) or 84 for the MELAB.

Those who have completed two years of instruction at a college or university where English is the language of instruction may have the English requirement waived.

Degrees

Bachelor of Science—The Division of Medical Technology offers the bachelor of science (B.S.) degree.

Master of Science—Graduate work in clinical laboratory science is available for qualified candidates who wish to prepare for a career of research, teaching, or work in industry. The master of science (M.S.) program in clinical laboratory science is offered by the Graduate School. The program is offered only under Plan A (master's degree with thesis). Each student must complete a thesis involving independent research in one of the subareas of this field under the direction of an adviser.

Admission requirements include a bachelor's degree from an accredited institution of higher learning with sufficient scholarly attainment in medical technology or chemistry and the biological sciences to justify graduate work in these areas.

For more information, see the *Graduate School Catalog* or contact the Clinical Laboratory Science Graduate Program Coordinator, MMC 609, 420 Delaware Street S.E., Minneapolis, MN 55455-0374 (612-625-8952).

Policies

Immunizations—Upon admission to the medical technology program, students are required to submit proof of the following immunizations and vaccinations:

- Measles/mumps/rubella documentation or positive titre
- Polio
- Tuberculosis skin test (Mantoux) or negative chest X-ray
- Hepatitis B series or documented immunity
- Past DTP or diphtheria/tetanus within the last 10 years
- Varicella Zoster, positive history or positive titre

Health Insurance Coverage—Medical technology students are expected to carry health insurance to cover emergency medical situations. The Blue Cross/Blue Shield student insurance policy is recommended because of its scope of coverage. Other personal, spousal, or parental policies that are equivalent to the Blue Cross/Blue Shield student policy are acceptable. Students should carry their insurance information at all times on clinical and community educational rotations.

Background Check—Medical technology students are placed in a variety of clinical settings during their clinical coursework. In accord with Minnesota law, a criminal background check is required of each student before clinical courses. The Division of Medical Technology arranges this check.

Satisfactory Academic Progress—Students in the professional program are subject to the regulations established by the Division of Medical Technology and must maintain satisfactory academic progress.

Satisfactory performance is considered to be not only a passing level in scientific and technical skills together with theoretical knowledge, but also complete personal integrity and honesty.

Students not achieving satisfactory progress may be placed on scholastic probation upon recommendation of the Student Scholastic Standing Committee (SSSC). This committee is composed of Division of Medical Technology faculty and student representatives, as appropriate.

Students' work is considered unsatisfactory when they earn less than a C- grade average (1.67 grade points for each credit) for any course in a given year or semester. In addition, students must earn a minimum grade of C- in selected courses to enroll in related clinical rotations, and maintain an overall GPA of 2.00 in the professional program.

If students receive an unsatisfactory grade in a course, remedial work in the course may be provided, if possible; if not, students must repeat the course the next time it is offered. If students receive an unsatisfactory grade in more than one course, either concurrently or in different semesters, the matter is referred to the SSSC for investigation and action. If the committee decides students should not continue in the curriculum, students are notified. Unsatisfactory grades in two courses are sufficient basis for dismissal.

Medical Technology Essential Functions

To successfully complete a clinical laboratory science program, medical technology students must be able to perform the following functions.

Communication skills—Must be able to communicate effectively in written and spoken English; comprehend and respond to both formal and colloquial English—person-to-person, by telephone, and in writing; appropriately assess nonverbal as well as verbal communication.

Locomotion—Must be able to move freely from one location to another in physical settings, such as the clinical laboratory, patient areas, corridors, and elevators.

Small motor skills—Must have sufficient eye-motor coordination to allow delicate manipulations of specimens, instruments, and tools. Must be able to grasp and release small objects (e.g., test tubes, microscope slides); twist and turn dials/knobs (e.g., for a microscope, balance, or spectrophotometer); and manipulate other laboratory materials (e.g., reagents and pipettes) in order to complete tasks.

Other physical requirements—Must be able to lift and move objects of at least 20 pounds. Must have a sense of touch and temperature discrimination.

Visual acuity—Must be able to identify and distinguish objects macroscopically and microscopically; read charts, graphs, and instrument scales.

Safety—Must be able to work safely with potential chemical, radiologic, and biologic hazards and follow prescribed guidelines for working with all potential hazards, including mechanical and electrical.

Professional skills—Must be able to follow written and verbal directions; work independently and with others and under time constraints; prioritize requests and work concurrently on at least two different tasks; maintain alertness and concentration during a normal work period.

The medical technology program holds the only two endowed professorships in medical technology in the United States.

Stability—Must possess the psychological health required for full use of abilities and be able to respond to others in a collegial manner; must be able to recognize emergency situations and take appropriate actions.

Affective (valuing) skills—Must show respect for self and others and project an image of professionalism, including appearance, dress, and confidence; and have complete personal integrity and honesty. Must adhere to appropriate professional deportment.

Application skills—Must be able to apply knowledge, skills, and values learned from previous coursework and life experiences to new situations.

Certification and Placement

Division of Medical Technology graduates are eligible to take national examinations for certification as medical technologists or clinical laboratory scientists. These examinations are conducted by national certifying agencies. Many organizations/institutions require certification for employment.

Program graduates are assisted in finding employment by the Division of Medical Technology adviser. Notices of employment opportunities in the field are received from all parts of the United States and are posted in this office.

Licensure

The licensed medical technologist practices in accordance with the requirements of individual state laws. In some states, a medical technologist must participate in continuing education courses for license renewal. Minnesota does not require a license to practice.

Advising

The Division of Medical Technology offers centralized advising services to undergraduates currently enrolled or interested in medical technology. In addition, the medical technology adviser works closely with the College of Liberal Arts natural science advisers. For more information, contact the medical technology office, 15-170 Phillips-Wangensteen Building (612-625-9490).

Special Learning Opportunities and Resources

Minority Program—The Academic Health Center is committed to the recruitment and retention of minority persons who come from groups underrepresented in the health professions. Advising and special courses are offered through the Martin Luther King Program and the following learning resource centers: African American Learning Resource Center, American Indian Learning Resource Center, Asian/Pacific American Learning Resource Center, and Chicano-Latino Learning Resource Center.

Scholarships

The Division of Medical Technology offers seven scholarship programs for students in the professional program. Scholarships are provided on the basis of scholastic achievement, need, and professional promise. For more information, contact the medical technology office, 15-170 Phillips-Wangensteen Building (612-625-9490).

Career Paths

The Extended Career Paths in Medical Technology chart on page 214 represents positions taken by University of Minnesota medical technology graduates. It depicts the opportunity and versatility afforded by a medical technology (laboratory science) degree for positions not only in hospital laboratories, but also in industry, research, public health, government, information systems, consulting, reference (private) laboratories, education, and other areas.

Student Organizations

Council for Health Interdisciplinary Participation—The Council for Health Interdisciplinary Participation (CHIP) is an interdisciplinary student service organization dedicated to enhancing the quality of life and education of all Academic Health Center students. Activities include noontime lectures, evening workshops, and weekend symposia in areas such as bioethics, international health, alternative health care, and women's issues. CHIP publishes a newsletter featuring announcements of upcoming health sciences events, volunteer opportunities, and articles about topics of current interest to students. CHIP headquarters are located in an informal, comfortable lounge in 1-425 Malcolm Moos Health Sciences Tower. For more information, call 612-625-7100.

Medical Technology Student Council—Students in the professional program are represented on the Medical Technology Council by elected members from each class. The council promotes student-faculty relationships, sponsors social and educational activities, and considers matters affecting students in the program.

Student Membership in Professional Organizations—Medical technology undergraduates are eligible for student membership in the American Society for Clinical Laboratory Science. Medical technology students are also urged to participate in the activities of the Academic Health Center's Council for Health Interdisciplinary Participation (CHIP) and other University student organizations.

Campus Contacts

Patricia Solberg, Division of Medical Technology, University of Minnesota, MMC 609, 420 Delaware Street S.E., Minneapolis, MN 55455-0374. Offices at 15-170 Phillips-Wangensteen Building (612-625-9490; e-mail medtech@umn.edu). Web site: <http://medtech.umn.edu>.

Medical Technology

Degree Program

Medical Technology

B.S.

Admission Requirements—Prerequisite courses include composition, general biology, mathematics (college algebra or calculus), general inorganic chemistry, physiology, and organic chemistry.

A minimum GPA of 2.50 is required for entrance to the program. Recent entering class average GPAs have been approximately 3.10.

Degree Requirements

The program requires a minimum of 120 credits of which at least 60 credits are prerequisites and liberal education courses (see liberal education Web site at <www.onestop.umn.edu/registrar/libed/>. Junior courses include biochemistry, microbiology, and genetics. Senior courses involve two semesters of professional coursework in hematology, coagulation/instrumentation, clinical chemistry and urinalysis, microbiology/mycology/virology/parasitology and immunohematology/immunology/molecular diagnostics. All required and highly recommended courses, e.g., anatomy and pathophysiology must be taken A-F.

Writing Intensive Courses—Students must take four writing intensive courses. These courses are in addition to freshman writing as currently required. At least two of the four required writing intensive courses must be taken at 3xxx or above. MedT 4127W—Introduction to Management and Education I is required for the program and serves as one of the upper division writing intensive courses. Course choices can be found at <www.onestop.umn.edu/registrar/libed/writing.html>.

Required Courses

Preprofessional Program

Biol 1009—General Biology
Phsl 3051—Human Physiology
Chem 1021-1022—Chemical Principles I-II
Chem 2301-2302—Organic Chemistry I-II
EngC 1011—University Writing and Critical Reading
Two from Math 1031, 1142, 1155, 1271, 1272, Stat 3011

Professional Program

Year 3

Biol 4003—Genetics
or GCD 3022—Genetics
BioC 3021—Biochemistry
Biol/MicB/VPB 2032—General Microbiology With Laboratory

Year 4

MedT 4064—Introduction to Clinical Immunohematology
MedT 4065—Introduction to Clinical Immunohematology: Laboratory
MedT 4100—Virology, Mycology, and Parasitology for Medical Technologists
MedT 4104—Principles of Diagnostic Microbiology: Lecture
MedT 4105—Principles of Diagnostic Microbiology: Laboratory
MedT 4127W—Introduction to Management and Education I
MedT 4251—Hematology I: Basic Techniques
MedT 4252—Hematology II: Morphology and Correlation
MedT 4253—Hemostasis
MedT 4310—Clinical Chemistry I: Lecture
MedT 4311—Clinical Chemistry I: Laboratory Applications
MedT 4320—Clinical Chemistry II: Lecture
MedT 4321—Clinical Chemistry II: Laboratory Applications
MedT 4400—Immunological and Molecular Basis of Laboratory Testing

Clinical Courses

MedT 4082—Applied Clinical Chemistry
MedT 4085—Applied Clinical Hematology
MedT 4086—Applied Clinical Immunohematology
MedT 4088—Applied Diagnostic Microbiology
MedT 4089—Specialty Rotation

Electives—Recommended courses

BioC 4002—Physiological Biochemistry of Human Systems
InMd 3001—Human Anatomy
LaMP 4177—Pathology for Allied Health Students
MedT 1010—Orientation in Medical Technology (S-N) (for those interested in the field)
MicB 4131—Immunology
Phar 1002—Health Sciences Terminology

Clinical Rotations

After completing two semesters of professional coursework, students spend 22 weeks in the clinical laboratories of various health care institutions in the Twin Cities and Rochester, Minnesota, including six weeks in clinical chemistry, five weeks in hematology and coagulation, five weeks in immunohematology, five weeks in microbiology, and one week in a specialty laboratory area such as molecular diagnostics.

This is the Mortuary Science section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Mortuary Science

Degree Program

Mortuary Science

General Information

The Program of Mortuary Science at the University of Minnesota, established in 1908, was the first program of its kind in this country to be organized at a state university. During the first 50 years of its existence, the program grew from a 6-week session to a 36-week course of study. In 1951, a two-year curriculum leading to the associate in mortuary science degree was approved. The course of study for the associate degree was expanded to three years in 1955. The bachelor of science degree with a major in mortuary science, granted upon satisfactory completion of a four-year curriculum, was approved by the Board of Regents in 1968. Impetus for the changes in program length and academic credentials resulted from changes in the philosophy and needs of the funeral service profession. Currently, the Program of Mortuary Science is part of the Medical School. The program is accredited by the American Board of Funeral Service Education, an agency recognized by the United States Office of Education, and the International Conference of Funeral Service Examining Boards, Inc.

Aims and Purposes

Upon completing the curriculum requirements, the graduate will have received a solid liberal arts foundation; synthesized the psychosocial aspects of grief and the funeral directing arts; developed technical competence in applying funeral service sciences; and identified business, legal, and ethical principles related to funeral service practice.

Objectives

The objectives of the program recognize an obligation to students, the profession, and the community. They have been adopted with respect to requirements of the Program of Mortuary Science, the University of Minnesota, the American Board of Funeral Service Education, the International Conference of Funeral Service Examining Boards, Inc., and the Minnesota Department of Health.

Upon completing the curriculum requirements for a bachelor of science degree with a major in mortuary science, the graduate will have identified and applied principles and theoretical concepts in the following areas:

- public health
- business
- natural sciences
- ethics
- behavioral science
- law

In addition, program graduates will have met the educational requirements prescribed by the American Board of Funeral Service Education; and requirements to become eligible for admittance to the International Conference of Funeral Service Examining Boards, Inc. National Board Examination.

Admission

Students usually enter the Program of Mortuary Science at the start of their junior year. Freshmen and sophomores interested in a mortuary science major are urged to contact the program office at A275 Mayo, MMC 740, 420 Delaware Street S.E., Minneapolis, MN 55455, for counsel in planning an appropriate preprofessional program. On the Twin Cities campus, freshmen and sophomores usually register in the College of Liberal Arts (CLA) or General College (GC) for their premortuary science work. Admission criteria and other information related to CLA and GC can be found in their respective college sections in this catalog. Applicants transferring from any regionally accredited college or university are given the same consideration as those who transfer from within the University. Applicants seeking admission to the Program of Mortuary Science who will be earning their first baccalaureate degree must have completed:

- the University of Minnesota high school preparation requirements (see Freshman Admission in the General Information section of this catalog).
- 60 semester credits with grades of A, B, C, or S from a regionally accredited college or university.
- prerequisite coursework with a GPA of 2.50 on a 4.00 scale.
- the preprofessional requirements of the Program of Mortuary Science—(a) at least one course in each of the areas of English composition, introduction to computers, a course which satisfies the mathematical thinking core requirement, general biology, accounting, general psychology, general chemistry with laboratory, a course which satisfies the historical perspectives core requirement, introduction to sociology, speech, microbiology, human anatomy plus (b) sufficient electives to total 60 credits. (Students who already have a bachelor's degree may be exempt from certain preprofessional requirements.)

Prospective students who have completed a college degree or have more than 60 semester credits should consult their adviser to determine the most appropriate academic term for admission. A student who has completed all of the admission requirements, liberal education requirements, and upper division electives may be able to complete degree requirements in three semesters.

Liberal Education Requirements

For University of Minnesota, Twin Cities campus liberal education requirements, see page 31 of this catalog.

Students entering the Program of Mortuary Science who have already completed a bachelor's degree, or have completed the Minnesota Transfer Curriculum, are exempt from the liberal education requirements but must meet all other admission requirements.

Application Procedure

Transfer Within the University—Students already admitted and registered at one college or campus of the University of Minnesota must submit an *Application for Change of College* form, available from the One Stop Student Services Center on any campus. Application deadlines for internal transfer are March 1 for fall semester admission, October 1 for spring semester admission, and April 15 for summer session admission.

Transfer From Outside the University—Those who have completed their preprofessional work at another university must apply for admission to the University of Minnesota. Transfer students should obtain the *Application for Undergraduate Admission* from the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2008); complete the form; and return it to that office. An official transcript from each institution outside the University where college work was attempted or completed must be sent to the Office of Admissions. A nonrefundable application fee is also required.

Orientation

Various orientation activities are offered to help students get acquainted with one another, the campus, and the program. These activities include individual and group meetings for program planning, and presentations on University resources and regulations. Students are notified of orientation dates at the time they receive registration information.

Policies

Credit Load

Most students take about 15 credits of coursework each semester. To take fewer than 12 credits per semester requires permission from the Student Scholastic Standing Committee. Registration for more than 18 credits per semester must also be approved by this committee.

Scholastic Progress

The scholastic probation system identifies, advises, and, if necessary, expels students who are having problems meeting academic standards.

Students' work is considered unsatisfactory when they earn less than a C grade average (2.00 GPA) for all credits earned in a given semester or a given year.

If a student receives unsatisfactory grades in more than one course, either concurrently or in different academic terms, the matter is referred to the Student Scholastic Standing Committee for investigation and action. The student ordinarily is placed on probation. The student is then required to make a contract with the Student Scholastic Standing Committee, agreeing to complete a specified number of credits during the following academic term with grades of C or better. If terms of the contract are not fulfilled, the student may be declared academically ineligible to continue in the program.

Students may be expelled from the program for one of the following reasons:

Dropped for Low Scholarship—Students who fail to meet the terms of their probation.

Hold for Committee Clearance—Students who have scholastic difficulties that indicate they should interrupt their studies for the time being even though their record may not require official drop action.

The Student Scholastic Standing Committee must approve a subsequent return to the program in such cases.

A student admitted to the program on probation must achieve satisfactory academic status during the first academic term of enrollment.

Graduation Requirements

To be recommended for the bachelor of science degree with a major in mortuary science, students must complete the University's graduation requirements (see Policies section). In addition, students complete a minimum of 120 credits outlined in Degree Requirements.

Certification/Licensure

Students planning to practice in a state other than Minnesota should determine the qualifications for licensure by writing to the licensing agency in the state in which they intend to practice. These regulations vary from state to state, are frequently changed, and students should make certain they have accurate information. National Certification—Program of Mortuary Science graduates are eligible to take the National Board Examination for Mortuary Science. The program arranges to have the test given on campus by the International Conference of Funeral Service Examining Boards.

Advising

Advisers assist students with program and career planning. It is recommended that the student's academic advisers approve student registrations for each academic term.

Resources

For information concerning financial aid available to all University students, visit the Office of Student Finance. Students may obtain materials for mortuary science scholarships by contacting the Program of Mortuary Science, University of Minnesota, MMC 740, 420 Delaware Street S.E., Minneapolis, MN 55455 (phone 612-624-6464; fax 612-626-4163). Offices are located at A275 Mayo Memorial Building, 401 Church Street S.E.

Student Organization

Student Association of the Program of Mortuary Science—Mortuary science majors automatically become members of this association, a forum for expressing student opinion and developing a liaison between students and faculty, and an organization to foster and support mortuary science education.

Contact Information

Program of Mortuary Science, University of Minnesota, MMC 740, 420 Delaware Street S.E., Minneapolis, MN 55455 (phone 612-624-6464; fax 612-626-4163; e-mail mortsci@umn.edu. Offices are located at A275 Mayo Memorial Building, 401 Church Street S.E.

The Program of Mortuary Science is the only program in the world housed in a medical school at a major research institution.

Mortuary Science

Degree Program

B.S.

The program combines coursework in basic and behavioral sciences, business, and liberal arts. Students usually enter the program at the beginning of their junior year.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 56 credits in the major. All courses must be completed with A, B, C, or S grades. The 120 credits include admission, preprofessional, liberal education, and required mortuary science courses.

For students earning their first baccalaureate degree, a minimum of 60 credits must be earned at 3xxx or higher. Students must also satisfy the University's writing intensive course requirement. At least four courses in a student's program must be classified as writing intensive (courses with a "W" following the course number), two (or more) of which must be at 3xxx or higher. Students also are responsible for satisfying the University's liberal education requirements.

For students who have completed their first baccalaureate degree from an accredited college, admission with advanced standing status is often possible. These individuals, as well as those who have completed the Minnesota Transfer Curriculum, are exempt from the liberal education requirements, but must meet all other admission and degree requirements as outlined by the University and the program of mortuary science.

A typical schedule for a student matriculating into the program as a junior is outlined below. Please note that students who apply for spring semester admission, or those who apply having already completed their first baccalaureate degree, would likely plan a different schedule that takes into consideration their previous coursework and other academic preparation.

Junior Year

Fall Semester

Mort 3005—History of Funeral Service (2 cr)
Mort 3012— Organization and Management of Funeral Business (3 cr)
Mort 3021W—Funeral Service Psychology (3 cr)
Mort 3379—Clinical Funeral Service Rotation (2 cr)
Phar 1002—Health Sciences Terminology (2 cr)
Electives/other courses

Spring Semester

InMd 3002/3302—Human Anatomy Laboratory (1 cr)
Mort 3016—Funeral Service Marketing and Merchandising (3 cr)
Mort 3022W—Funeral Service Counseling (3 cr)
Mort 3379—Funeral Service Clinical Rotation (2 cr)
PubH 3001—Personal and Community Health (2 cr)
Electives/other courses

Senior Year

Fall Semester

Mort 3014—Funeral Service Rules and Regulations (3 cr)
Mort 3025—Mortuary and Business Law (3 cr)
Mort 3051—Restorative Art (2 cr)
Mort 3061—Embalming Theory (3 cr)
Mort 3151—Restorative Art Laboratory (1 cr)
Mort 3161—Embalming Laboratory (1 cr)
Electives/other courses

Spring Semester

Mort 3018—Funeral Practice (3 cr)
Mort 3050—Embalming Pathology (3 cr)
Mort 3055W—Complicated Grief (3 cr)
Mort 3065—Embalming Chemistry (2 cr)
Mort 3370—Funeral Service Seminar (1 cr)
Electives/other courses

Summer Session

Mort 3380—Funeral Service Practicum (8 cr)

Elective Courses within the Major

Mort 3090—Independent Study in Funeral Service (non-writing intensive) (1-4 cr)
Mort 3091W—Independent Study in Funeral Service (writing intensive) (1-3 cr)

Final Project

Mort 3380—Funeral Service Practicum

In addition to (a minimum of) two semesters of clinical rotations at the start of their academic program, all students are required to complete an off-campus practicum following the completion of all other degree requirements. The practicum requires 320 clock hours of work at a University-affiliated mortuary and typically lasts for eight weeks. As with all clinical rotations, students are not allowed to be paid for the hours they work at their training sites and should budget accordingly when planning their academic program.

College of Natural Resources

This is the College of Natural Resources section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Degree Programs and Minors

College of Natural Resources

General Information

The mission of the College of Natural Resources (CNR) is to foster a quality environment by contributing to the management, protection, and sustainable use of our natural resources through teaching, research, and outreach.

Facilities—The college is housed in seven buildings on the University's Twin Cities campus. The Natural Resources Administration Building, Green Hall, Kaufert Laboratory, Hodson Hall, McNeal Hall, and the Engineering and Fisheries Laboratory are on the St. Paul campus; the Bell Museum of Natural History is on the Minneapolis campus.

The Dean's Office, Student Services Office, Graduate Studies Office, Natural Resources and Environmental Studies Program Office, Forestry Library, and CNR computer lab are located in the Natural Resources Administration Building. The Department of Forest Resources, Remote Sensing and GIS Lab, and some Department of Fisheries, Wildlife, and Conservation Biology faculty and graduate student offices are located in Green Hall. The Department of Wood and Paper Science is in the Kaufert Laboratory. The Department of Fisheries, Wildlife, and Conservation Biology office; Entomology, Fisheries, and Wildlife Library; labs; lecture rooms; and faculty facilities are in Hodson Hall and the Engineering and Fisheries Laboratory. The Water Resources Center is located in McNeal Hall. Adjacent to college facilities is the regional headquarters of the USDA Forest Service North Central Research Station.

CNR holds several field sessions at the Cloquet Forestry Center. The Center includes more than 3,700 acres of virgin and second-growth forest in a major forest products manufacturing area of northeastern Minnesota. Fisheries and wildlife; forest resources; natural resources and environmental studies; and urban and community forestry majors spend a three-week summer term at the Center during their sophomore and junior years. Forest resources students complete a five-week advanced forestry field session at the Center in their senior year.

The 300-acre John H. Allison Forest, about 10 miles from the St. Paul campus, is available for field laboratory work throughout the year.

CNR's undergraduate curricula are organized within three departments: the Department of Fisheries, Wildlife, and Conservation Biology (200 Hodson Hall); the Department of Forest Resources (115 Green Hall); the Department of Wood and Paper Science (203 Kaufert Laboratory); and an interdisciplinary program called natural resources and environmental studies (135 Natural Resources Administration Building).

The CNR Student Services Office, 135 Natural Resources Administration Building, provides admission, registration, advising, career services, and other assistance to all undergraduates. Call 612-624-6768 or visit the CNR Web site at <www.cnr.umn.edu>.

Admission

Undergraduates seeking admission to the College of Natural Resources should apply through the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2008). Prospective students are encouraged to call or visit the CNR Student Services Office, 135 Natural Resources Administration Building, 2003 Upper Buford Circle, St. Paul, MN 55018 (612-624-6768) for additional information regarding admission, honors program, careers, or scholarships.

Freshman Admission—For official and up-to-date information about the University's admissions policies, procedures, and deadlines, please see the latest edition of the *Undergraduate Application Booklet* available from the Office of Admissions or online at <http://admissions.tc.umn.edu>.

Transfer Admission—Appropriate credits earned at other accredited colleges and universities or within other units of the University may be applied toward CNR programs. Most students find they must transfer before their junior year to meet residence and upper division course requirements of CNR.

Credits earned through special examination or the College of Continuing Education may transfer to CNR. The minimum GPA for transfer admission is 2.00.

Degrees/Majors

Bachelor of Science (B.S.)

The major curricula of CNR all lead to B.S. degrees. CNR offers six major curricula:

- fisheries and wildlife (with specializations in fisheries, wildlife, and conservation biology);
- forest resources (with tracks in forest management and planning; and forest conservation and ecosystem management);
- natural resources and environmental studies (with concentrations in environmental assessment and monitoring; environmental education; planning, policy and law; resource conservation and environmental management; and water and soil resources);
- recreation resource management (with tracks in recreation resource management, and resource based tourism;
- urban and community forestry; and
- wood and paper science (with specializations in forest products marketing, forest products production management, paper science and engineering, and residential building science and technology).

Because the first year of coursework is somewhat similar among programs, students may transfer between majors at the end of their freshman or sophomore year with little or no credit loss.

Graduate Degrees—The master of science (M.S.) and the doctor of philosophy (Ph.D.) in forestry, fisheries, wildlife conservation, water resource science, or conservation biology, and the master of forestry (M.F.), are offered through the Graduate School in cooperation with CNR. For information more, consult the *Graduate School Catalog* or the CNR Web site at <www.cnr.umn.edu>.

Minors

CNR offers five minors designed to enhance the major programs of not only CNR students, but also students whose major programs are unrelated to natural resources. The minors are fisheries and wildlife, forest resources, natural resources and environmental studies, paper science and engineering, and urban and community forestry. CNR students may apply for a minor in any University department or program. Upon graduation, the minor is listed on the transcript with degree and major. For assistance in planning a minor, contact the CNR Student Services Office, 135 Natural Resources Administration Building, (612-624-6768). Detailed minor requirements are described in the CNR Degree Programs and Minors section of this catalog.

Honors

CNR students may participate in honors at both the lower division (freshman/sophomore) and upper division (junior/senior) level. At the lower division level, students participate in specially designed honors courses and honors colloquia focusing on current issues in their chosen field. Completion of the lower division honors program is recognized by a certificate and by designation on a student's transcript. The heart of the upper division honors program is a two-semester research project supervised by a faculty mentor. Students also participate in an honors seminar designed to expose them to science topics in their field. Upper division honors culminates in a senior thesis, oral presentation of the research project, and recognition at the college graduation ceremony.

Qualifications for Freshman Applicants

- admission to CNR
- completion of fewer than 30 semester credits of college coursework
- top 10 percent of high school graduating class or

  ACT composite score of 28 or combined SAT score (verbal + math) of 1260 (1200 if SAT was taken before April 1, 1995)

Application Procedure for Freshman Applicants—Applicants must complete the *Scholarships and Honors Programs for Freshmen* application form (available from the Office of Admissions) before June 1 of the year they enter the University.

Qualifications for Lower Division Non-Freshman and Transfer Applicants

- admission to CNR
- completion of between 31 and 60 semester credits of college coursework
- cumulative GPA of 3.30
- completion of CNR lower division honors application form

(Current CNR students are eligible to apply for lower division honors if they meet the qualifications for transfer applicants.)

Application Procedure for Non-Freshman and Transfer Applicants—Applicants must complete the CNR lower division honors application form, available through the CNR Student Services Office. (Students with 50-60 semester credits should apply directly to the upper division program when eligible.)

Completion of Lower Division Honors Program—To complete the lower division honors program, students must complete at least two honors colloquia. At least one colloquium must be a section of NRES 3003H—Honors Colloquium. CNR honors students are eligible for registration in colloquia offered through other University honors programs and transfer institutions.

Students must also complete at least two honors courses with a grade of B or better, and 60 semester credits with a cumulative GPA of 3.30 or higher.

Qualifications for Upper Division Applicants

Upper division honors students must have a cumulative GPA of 3.30 or higher with at least 60 credits completed. After admission, students must achieve a GPA of at least 3.50 in their last 60 credits.

Application Procedure for Upper Division Applicants—Students must submit an upper division honors application, a research proposal, and a faculty mentor's letter of recommendation. The application may be obtained from the CNR Student Services Office.

Completion of Upper Division Honors Program—Research Project—Students conduct research and acquire new information about the topic under investigation. Students are encouraged to submit their results for publication in a professional journal, if warranted.

Honors Seminar—Honors program students participate in one honors seminar within their department. Seminars typically focus on problem analyses and research reports concerning selected topics.

Graduation with Honors—Participation in the honors program is required for graduation with the traditional honors designations of *cum laude*, *magna cum laude*, or *summa cum laude*, defined below. Candidates for graduation with honors must complete the following:

- At least 40 credits in upper division courses (3xxx, 4xxx, or 5xxx) at the University of Minnesota, Twin Cities.
- Two semesters (2 credits/semester) of directed research with the results reported in an acceptable honors thesis and as an oral seminar. Students may use research they conducted while participating in the Undergraduate Research Opportunities Program if approved by the departmental honors program coordinator to partially fulfill the directed research component of their honors program. Courses are FW 4801H, FW 4802H; FR 4801H, FR 4802H; NRES 4801H, NRES 4802H; and WPS 4801H, WPS 4802H.
- One semester (1 credit) of honors seminar within the student's chosen curriculum: FW 4200, FR 4200, NRES 4200, WPS 4200.
- The last 60 credits of A-F registration (including transfer coursework) with the minimum GPAs specified below.

Transcripts of students graduating with honors show one of the following:

Cum laude (minimum GPA: 3.50);

Magna cum laude (minimum GPA: 3.66);

Summa cum laude (minimum GPA: 3.75).

Students also receive recognition during commencement.

Policies

College Level Examination Program (CLEP)— Students may earn credit for the CLEP social science and humanities examinations prepared by the College Entrance Examination Board. CLEP also offers a number of subject examinations for credit.

CNR accepts CLEP scores at the 75th percentile or higher for exemption up to 8 credits in a selected number of courses. Contact the CNR Student Services Office for more information.

Dean's List—To be eligible for the CNR Dean's List, a student must be a current CNR student and have completed 12 credits (A-F registration) with a GPA of at least 3.67. Students on the Dean's List receive a letter from the dean and are publicly listed in the Honors and Recognition area of the Natural Resources Administration Building. There is a transcript notation for each term a student is on the Dean's List.

Extra Credit—Students may register for 1 to 3 extra credits in some courses, with the instructor's approval. The extra work is mutually agreed upon by the student and the instructor and conducted independently of class. Contact the CNR Student Services Office for more information.

Grading—All required courses in the major must be taken A-F with grades of C- or better; students who receive a grade below C- in a major course must repeat the course.

Honor System—Under an honor system adopted on the St. Paul campus, students accept responsibility for the supervision of student behavior during examinations and pledge not to give or receive aid. A student or faculty member who observes an act of dishonesty must report the incident to the college Student Scholastic Standing Committee. For more information about how the honor system works, contact the CNR Student Services Office.

Independent Study—With instructor approval, students may take regularly offered courses through independent study without attending class. Contact the CNR Student Services Office for more information.

Policy Waivers—Occasionally it may be to the educational advantage of both the student and the department to consider an alternative or substitution in an academic policy or curricular requirement, provided the basic spirit of the policy or requirement is maintained. A student may petition for a departure from normal procedure. Students must receive major adviser/departmental recommendation before the petition is routed to the Student Scholastic Standing Committee.

Repeating Courses—Students may repeat a course in which a grade less than C- is earned. A course may be repeated only once and the grade in the repeated course is counted in GPA and credit totals; the first grade is bracketed (does not count toward credit totals or cumulative GPA). It is the student's responsibility to report any repeated courses to the CNR Student Services Office.

Special Examinations for Credit—Students who believe their knowledge of a subject is equal to that required to complete a particular course may request to take an examination for credit. If the Student Scholastic Standing Committee and the department approve, arrangements can be made with an appropriate instructor to take an examination. Usually no grade is assigned. A fee is assessed for each examination. Credit by special examination is not granted for language or mathematics courses taken in high school.

Suspension—To appeal a suspension (see Probation in the Policies section of this catalog), a student must obtain a *Petition for Reinstatement* from the CNR Student Services Office. The petition must be completed and turned in to the Student Scholastic Standing Committee, along with any supporting documents. The final decision rests with the Student Scholastic Standing Committee, which informs the student of its decision in writing.

Graduation Requirements

To receive the B.S. degree, CNR students must meet the following requirements.

- Complete the prescribed curriculum as specified in the student's degree program.
- Achieve a cumulative GPA of at least 2.00, with grades of C- or better in each course in the major. Major coursework is defined as all required courses listed in each major program including specialization courses, track courses, concentration courses, professional courses, and writing courses. The only courses not included in this policy are free electives and courses taken beyond those in the major coursework to satisfy liberal education requirements.
- Satisfy liberal education requirements.
- Satisfy residence and other general University requirements.
- Officially apply for graduation.
- Meet all financial obligations to the University.

Graduation With Distinction or With Honors—See the Policies section of the catalog.

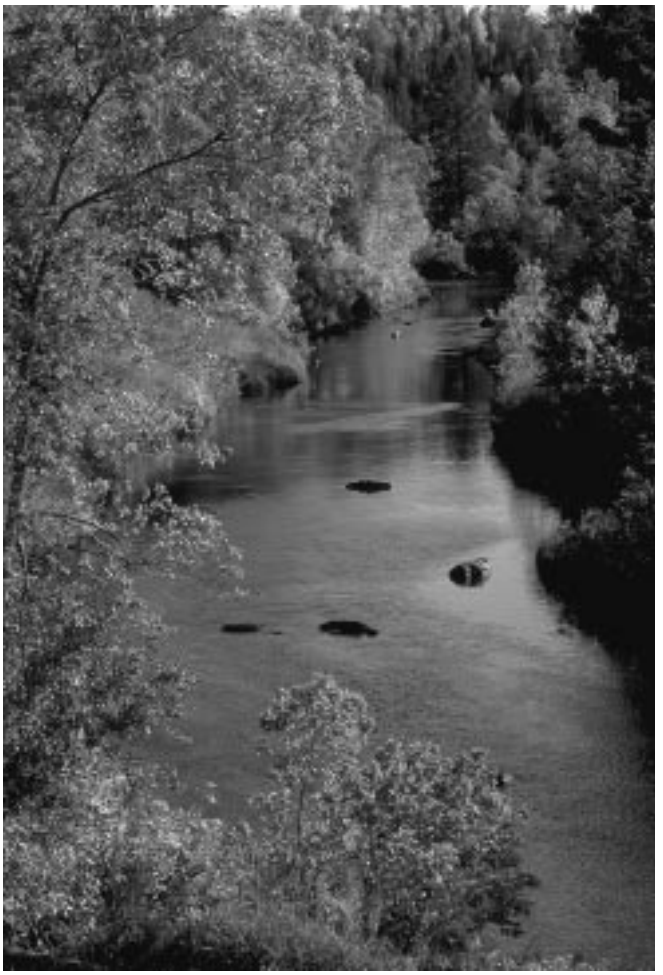
Liberal Education—Students must meet the University's liberal education requirements, including the diversified core and designated theme requirements. The diversified core requirements can be met by completing the core curriculum listed in each CNR degree program. To satisfy the designated theme requirements, at least 3 credits are required in each of the following areas: cultural diversity; international perspectives; environment; and citizenship

Visit the CNR Student Services Web site at <www.cnr.umn.edu/ug/ugmain.html>.

and public ethics. The environment and international perspectives themes may be satisfied by completing the required courses in each degree program. The remaining themes may be satisfied by careful selection among core professional and elective courses. See individual CNR degree programs for specific courses.

Field Session Requirements—Forest resources, urban and community forestry, and fisheries and wildlife majors are required to complete a three-week summer field session at the Cloquet Forestry Center in their sophomore or junior years. To attend, students must have completed 30 semester credits and attained a cumulative GPA of at least 2.00. Forest resources and urban and community forestry students must also have completed the following courses with a grade of at least C-: Biol 1009 or 1001, Chem 1011 or 1021, and precalculus or college algebra. Fisheries and wildlife students must have completed the following courses with a grade of at least C-: one year or introductory biology and Biol 3407. NRES students are required to complete either a field session at Cloquet or complete NRES 3051—Experience and Training in a Field Setting (1-3 cr). To register for the field session, NRES students must have completed Biol 1009 or 1001, and FR 3104 or Biol 3407. The Cloquet session is also open to students not enrolled in CNR.

Students in the forest resources major are required to complete an advanced field session at the Cloquet Forestry Center in their senior year. To attend, students must attain a cumulative GPA of at least 2.00, complete the introductory field session, FR 4218, 4262, 4411, and 4431. This five-week session is held in the spring during the May session and the first part of the summer session.



Advising

Advising services for both current and prospective students are provided by professional advisers in the Student Services Office and by department faculty.

Each CNR student, with adviser assistance, is responsible for learning curricular and graduation requirements and developing a course program and timetable to meet them. All freshmen and first-year transfer students are assigned an adviser in the Student Services Office for their first year or first semester respectively. Students are then assigned a faculty adviser within their major area of study.

Special Learning Opportunities

Forest Products Cooperative Education Program—Students in this program alternate periods of employment in their career fields with periods of academic study. The program leads to a B.S. in wood and paper science with a specialization in paper science and engineering, forest products production management, forest products marketing, or residential building science and technology. Full-time students who have declared a major in wood and paper science and who have at least a 2.70 GPA may apply. For more information, contact Joseph Massey, head of the Department of Wood and Paper Science, 209 Kaufert Laboratory (612-624-7459).

Fisheries and Wildlife Field Trip—Fisheries and wildlife majors are eligible to participate in a spring break field trip during their senior year. Selection for participation is competitive, based on previous academic performance. Students travel with a faculty member or graduate student(s) to the western United States to observe and discuss ongoing fisheries and wildlife management activities. Local natural resources agency personnel provide on-site information. Selected students register for one credit of FW 4565—Fisheries and Wildlife Ecology and Management: Field Trip during the May session following spring semester.

Wildlife Handling—FW 5625—Wildlife Handling offers hands-on experience immobilizing, assessing, and testing large animals. Students interested in conservation biology, zoo management or wildlife gain a unique perspective from this four-day, intensive course.

Advanced Water Quality—NRES 4062—Advanced Water Quality, offered during May session, provides an intensive, two-week field experience.

International Programs

Two types of study abroad that can especially enhance degree work in CNR are field study and integrated classroom study. Minnesota Studies in International Development is a field study program offering coursework and grassroots internships in Ecuador, India, Kenya, or Senegal. The Student Project for Amity among Nations (SPAN) consists of summer overseas research on a topic of the student's choosing, preceded by a year's on-campus preparation and followed by project write-up in the fall. The four SPAN destinations change from year to year. The University also cosponsors two specialized options for CNR students: a tropical biology/conservation program in Costa Rica and a marine biology program in Denmark.

Integrated classroom study programs permit students to take regular university courses alongside students from the host-country. The University's student exchanges and consortium memberships provide access to universities in many countries. Conservation and resource management curricula taught in English are available in Australia, Canada, Fiji, Finland, Ghana, the Netherlands, the Philippines, South Africa, Tanzania, and the

United Kingdom. Students with sufficient language fluency may instead choose to study in Dutch (the Netherlands), Finnish (Finland), French (France), German (Germany), Italian (Italy), Korean (South Korea), Portuguese (Brazil), Spanish (Argentina, Colombia, Mexico, Spain, Uruguay), Swedish (Finland, Sweden), or Thai (Thailand).

Other Study Abroad Opportunities—CNR students need not always seek credit in their major. Study abroad is encouraged for language acquisition or cultural learning. The resulting credits can often be used as electives or to fulfil second language or liberal education requirements. The University and other institutions sponsor a broad range of intensive language and area studies programs. For more information, students should call the Global Campus (612-626-9000).

Career Information

CNR offers assistance and advice to students seeking summer jobs and internships, as well as permanent employment after graduation. Job search assistance for all students is provided by the career services coordinator and by department faculty. A series of special employment seminars are provided by the Career Services Office on topics such as résumé writing, interviewing, initiating internship and job searches, and summer/seasonal intern hiring updates. Each major also requires an orientation class for all incoming students to provide interaction with faculty and alumni in their chosen professional field.

Student Organizations

Governance—Students are encouraged to participate in governance activities at the department, college, or campus level. Within each department, several committees (including curriculum committees) have student representatives. Students serve on CNR committees and on the Student-Faculty Board, which advises the dean on student issues and concerns. Students may also participate in the St. Paul Campus Board of Colleges, which directs student activities and acts as a liaison between the student body and administration, and on the Student Center Board of Governors, which establishes programs, operation policies, and budgets for the St. Paul Student Center and Coffman Union. Finally, CNR student senators are elected to serve on the executive committee of the Minnesota Student Association and the Senate.

Clubs—Student clubs in CNR include the Environmental Studies Club, Forestry Club, Student Chapter of the Society of American Foresters, Recreation Resource Management Club, Forest Products Society/Student Chapter, Student Chapter of the Technical Association of the Pulp and Paper Industry (TAPPI), Student Chapter of the Paper Industry Management Association (PIMA), Student Chapter of the Institute of Packaging Professionals (IOPP), Fisheries, Wildlife and Conservation Biology Club (with an affiliated student chapter of The Wildlife Society), Women in Natural Resources, Xi Sigma Pi Honor Society, Water Quality Team, Urban Forestry Club, Residential Building Science and Technology Club.

Directory

(area code 612)

CNR Administration

Dean's Office
235 Natural Resources Administration Building
624-1234
<www.cnr.umn.edu>

Student Services
135 Natural Resources Administration Building
624-6768
<www.cnr.umn.edu/ug>

Career Services
135 Natural Resources Administration Building
624-6768
<www.cnr.umn.edu/careers/index.php>

Admissions/Prospective Student Services
135 Natural Resources Administration Building
624-6768
<www.cnr.umn.edu/ug/prospective/>

Departments, Divisions, and Programs

Bell Museum of Natural History
10 Church Street S.E.
624-7083
<www1.umn.edu/bellmuse/>

Fisheries, Wildlife, and Conservation Biology
200 Hodson Hall
624-3600
<www.fw.umn.edu>

Forest Resources
115 Green Hall
624-3400
<www.cnr.umn.edu/FR/>

Natural Resources and Environmental Studies
135 Natural Resources Administration Building
624-6768
<www.cnr.umn.edu/ug/>

Wood and Paper Science
207 Kaufert Lab
625-5200
<www.cnr.umn.edu/WPS/>

Cloquet Forestry Center
Cloquet, MN 55720
218-879-0850
<www.cnr.umn.edu/cfc/>

Visit the CNR Career Center for listings of summer jobs, internships, and permanent jobs in environmental and natural resources areas.

College of Natural Resources

Degree Programs and Minors

Fisheries and Wildlife

Department of Fisheries, Wildlife, and Conservation Biology

B. S.

The fisheries and wildlife curriculum gives students a broad science background emphasizing biological and environmental sciences and other coursework needed for careers in fisheries, wildlife, conservation biology, and other natural resource and environmental fields. Graduates are prepared to research, plan, and implement the management, protection, and enhancement of fisheries and aquatic resources, wildlife resources, and biological diversity. Graduates find employment as fisheries and wildlife scientists and managers, naturalists, zoo biologists, environmental biologists, environmental educators, and other natural resource professionals. The program also provides students with the fundamental science background needed to enter a wide variety of graduate programs in biological and natural resource sciences as well as professional programs in veterinary medicine, environmental law, and environmental education.

Students select an area of specialization, usually by the end of the sophomore year. The areas of specialization are described on the following pages. Although no computer course is required, students are expected to be computer literate and competent using word processing, spreadsheet, and e-mail software.

Degree Requirements

To complete the degree, students must complete 128 credits. After completing a core curriculum that includes liberal education, communications, basic science, mathematics, and an orientation to the fields of fisheries, wildlife, and conservation biology, students complete additional credits in one of three areas of specialization: fisheries, wildlife, or conservation biology. Some of the core curriculum courses also fulfill diversified core and designated theme requirements. For more information about liberal education requirements, see page 31 in this catalog.

All required courses in the major must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

EngC 1013—University Writing and Critical Reading: Nature and the Environment (4 cr)
or Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking

FW 4001—Biometry (4 cr)
or Stat 5021—Statistical Analysis (4 cr)
Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
or Math 1131—Finite Mathematics (3 cr)
and Math 1142—Short Calculus (4 cr)

Physical, Chemical, and Biological Sciences

Biol 2012—General Zoology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
GCD 3022—Genetics (3 cr)
or Biol 4003—Genetics (3 cr)

Select one of the following groups:

Biol 1009—General Biology (4 cr)
and Biol 2022—General Botany (3 cr)
or Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
and Biol 1002W—Introductory Biology II: Molecular, Cellular, and Developmental Perspectives (5 cr)

Select one of the following groups:

Phys 1001W—Energy and the Environment (4 cr)
and Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
or Ast 1001—Exploring the Universe (4 cr)
or Geog 1425—Introduction to Meteorology (3 cr)
and Geog 1426W—Introduction to Meteorology Laboratory (1 cr)
or Phys 1101—Introductory College Physics I (4 cr)
and Phys 1102—Introductory College Physics II (4 cr)
or Phys 1201—Introductory Physics for Pre-Medicine and Biology I (5 cr)
and Phys 1202—Introductory Physics for Pre-Medicine and Biology II (5 cr)

Core Courses

Biol 3407—Ecology (3 cr)
FW 1001—Orientation in Fisheries, Wildlife, and Conservation Biology (1 cr)
NRES 3011W—Ethics and Leadership in Resource Management (3 cr)

Conservation Biology Specialization

The conservation biology specialization is for students interested in careers dealing with a broad range of conservation issues in aquatic or terrestrial habitats. Positions typically focus on protection of endangered species and management for biodiversity. Careers as environmental educators or naturalists are also options.

All required courses in the specialization must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communications, Leadership, Policy

Choose two of the following:

FW 5003—Human Dimensions of Biological Conservation (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
NRES 3241W—Natural Resources Policy and Administration (3 cr)

Animals and Plants

Select three of the following, including one plant and one animal course:

EEB 4134—Introduction to Ornithology (4 cr)
Ent 5021—Insect Taxonomy and Phylogeny (4 cr)
Ent 5361—Aquatic Insects (3 cr)
FW 4129—Mammalogy (4 cr)
FW 4136—Ichthyology (4 cr)
FR 1101—Dendrology (3 cr)
PBio 4321—Taxonomy of Minnesota Flora (3 cr)
PBio 4511—Plant Systematics (3 cr)

Community and Ecosystem Ecology

LA 3204—Landscape Ecology (3 cr)

Select one of the following:

EEB 4014W—Ecology of Vegetation (3 cr)
EEB 4016—Ecological Biogeography (3 cr)
EEB 4601—Limnology (3 cr)
EEB 4609W—Ecosystem Ecology (3 cr)
EEB 5122—Plant Interactions with Animals and Microbes (4 cr)
FR 5142—Tropical Forest Ecology (3 cr)

Fisheries, Wildlife, and Conservation Biology

FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
FW 4108—Field Methods in Research and Conservation of Vertebrate Populations (Cloquet) (3 cr)
FW 4106—Important Plants in Fisheries and Wildlife Habitats (Cloquet) (1 cr)
or other related field session approved by department
FW 4701—Fisheries and Wildlife Problem Solving (2 cr)
or FW 4801H—Honors Research (2 cr)
and FW 4802H—Honors Research (2 cr)
and FW 4200H—Honors Seminar (1 cr)

Select one of the following:

FW 5051—Analysis of Populations (3 cr)
FW 5601—Fisheries Analysis (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr)
FW 5604W—Fisheries Ecology and Management (3 cr)

Electives—Select courses to total 128 credits for graduation with the B.S. degree. Please give strong consideration to courses on the list below or in any of the three areas of specialization (i.e., fisheries, wildlife, conservation biology).

FR 3131—GIS in Natural Resource Analysis (3 cr)
NRES 3001—Colloquium: Perspectives on Treaty Rights (2 cr)
NRES 3002—Colloquium: Exotic Species (2 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
NRES 3101—Conservation of Plant Biodiversity (3 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
NRES 4811—Natural Resources Interpretation (3 cr)
NRES 5002—Colloquium: Restoration of Aquatic Systems (1 cr)

Fisheries Specialization

The fisheries area of specialization is for students who wish to pursue careers in fisheries and aquatic resource science, management, and administration; fish hatchery management; and aquaculture, aquatic education, and aquatic environmental assessment. The curriculum meets the education criteria for the Certified Fisheries Professional designation established by the American Fisheries Society, the major professional organization for fisheries scientists and managers in North America.

All required courses in the specialization must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communications, Leadership, Policy

Select one of the following:

FW 5003—Human Dimensions of Biological Conservation (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
NRES 3241—Natural Resources Policy and Administration (3 cr)

Animals and Plants

FW 4136—Ichthyology (4 cr)
FW 4401W—Introduction to Fish Physiology and Behavior (4 cr)
or Biol 3211—Animal Physiology (3 cr)
or AnSc 2301—Systemic Physiology (4 cr)

Select one of the following:

Ent 5021—Insect Taxonomy and Phylogeny (4 cr)
Ent 5361—Aquatic Insects (3 cr)
PBio 4321—Taxonomy of Minnesota Flora (3 cr)
PBio 4511—Plant Systematics (3 cr)

Community and Ecosystem Ecology

EEB 4601—Limnology (3 cr)

Select one of the following:

EEB 4607—Plankton Ecology (4 cr)
EEB 4609W—Ecosystems Ecology (3 cr)
EEB 5053—Ecology: Theory and Concepts (4 cr)

Fisheries, Wildlife, Conservation Biology, and Chemistry

FW 4106—Important Plants in Fisheries and Wildlife Habitats (Cloquet) (1 cr)
FW 4108—Field Methods in Research and Conservation of Vertebrate Populations (Cloquet) (3 cr)
FW 4701—Fisheries and Wildlife Problem Solving (2 cr)
or FW 4801H—Honors Research (2 cr)
and FW 4802H—Honors Research (2 cr)
and FW 4200H—Honors Seminar (1 cr)
FW 5601—Fisheries Analysis (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr)
or EEB 4134—Introduction to Ornithology (4 cr)
or FW 4129—Mammalogy (4 cr)
FW 5604W—Fisheries Ecology and Management (3 cr)

Select one of the following:

Chem 2101—Introductory Analytical Chemistry Lecture (3 cr)
and Chem 2111—Introductory Analytical Chemistry Lab (1 cr)
or BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
and Chem 2301—Organic Chemistry I (3 cr)
or Chem 2301—Organic Chemistry I (3 cr)
and Chem 2302—Organic Chemistry II (3 cr)
or Pre-veterinary medicine students must take the following:
Chem 2301—Organic Chemistry I (3 cr)
and Chem 2302—Organic Chemistry II (3 cr)
and Chem 2311—Organic Chemistry Lab (3 cr)

Electives—Select courses to total 128 credits for graduation with the B.S. degree. Please give strong consideration to courses on the list below or in any of the three areas of specialization (i.e., fisheries, wildlife, conservation biology).

BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
EEB 4621—Limnology Laboratory (1 cr)
FR 3114—Forest Hydrology and Watershed Management (3 cr)
FW 5411—Aquatic Toxicology (3 cr)
FW 5455—Sustainable Aquaculture (3 cr)
NRES 3001—Colloquium: Perspectives on Treaty Rights (2 cr)
NRES 3002—Colloquium: Exotic Species (1 cr)

The *1999 Gourman Report* ranked the fisheries and wildlife program #5 in the nation.

NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
NRES 4811—Natural Resources Interpretation (3 cr)
NRES 5002—Colloquium: Restoration of Aquatic Systems (1 cr)

Wildlife Specialization

The wildlife specialization is for students who wish to pursue careers in wildlife science, management, and administration; zoo biology; terrestrial ecology; environmental assessment; and education. With proper selection of electives, students can meet the education criteria for the Certified Wildlife Biologist designation established by the Wildlife Society, the major professional organization for wildlife scientists and managers in North America.

All required courses in the specialization must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communications, Leadership, Policy

Select one of the following:
FW 5003—Human Dimensions of Biological Conservation (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
NRES 3241W—Natural Resources Policy and Administration (3 cr)

Animals and Plants

EEB 4134—Introduction to Ornithology (4 cr)
FW 4129—Mammalogy (4 cr)
FW 4401W—Introduction to Fish Physiology and Behavior (4 cr)
or Biol 3211—Animal Physiology (3 cr)
or AnSc 2301—Systemic Physiology (4 cr)

Community and Ecosystem Ecology

Select one of the following:
EEB 4601—Limnology (3 cr)
EEB 4609W—Ecosystem Ecology (3 cr)
EEB 5053—Ecology: Theory and Concepts (4 cr)
FR 5142—Tropical Forest Ecology (3 cr)

Select one of the following:
EEB 4014W—Ecology of Vegetation (3 cr)
EEB 4016—Ecological Biogeography (3 cr)
EEB 5122—Plant Interactions with Animals and Microbes (4 cr)
LA 5204—Landscape Ecology (3 cr)

Fisheries, Wildlife, and Conservation Biology

FW 4106—Important Plants in Fisheries and Wildlife Habitats (Cloquet) (1 cr)
FW 4108—Field Methods in Research and Conservation of Vertebrate Populations (Cloquet) (3 cr)
FW 4701—Fisheries and Wildlife Problem Solving (2 cr)
or FW 4801H—Honors Research (2 cr)
and FW 4802H—Honors Research (2 cr)
and FW 4200H—Honors Seminar (1 cr)
FW 5051—Analysis of Populations (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr)
FW 5604W—Fisheries Ecology and Management (3 cr)
or FW 4136—Ichthyology (4 cr)
or FW 5455—Sustainable Aquaculture (3 cr)

Electives—Select courses to total 128 credits for graduation with the B.S. degree. Please give strong consideration to courses on the list below or in any of the three areas of specialization (i.e., fisheries, wildlife, conservation biology).

BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Biol 3409—Evolution (3 cr)
EEB 5033—Population and Quantitative Genetics (4 cr)
Ent 5041—Insect Ecology (3 cr)
FR 3114—Forest Hydrology and Watershed Management (3 cr)
FR 3262—Remote Sensing of Natural Resources (3 cr)
FR 3411—Silviculture Systems (3 cr)
or NRES 3021—Plant Resource Management and the Environment (3 cr)
FW 5571—Avian Conservation (3 cr)
FR 3131—GIS in Natural Resources Analysis (3 cr)
Hort 5071—Restoration and Reclamation Ecology (3 cr)
NRES 3002—Colloquium: Exotic Species (2 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
PBio 4321—Taxonomy of Minnesota Flora (3 cr)
RRM 4232W—Management of Recreational Lands (4 cr)
Stat 5303—Designing Experiments (4 cr)

Fisheries and Wildlife Minor

The fisheries and wildlife minor enables students in programs such as biology, communications, education, forestry, natural resources and environmental studies, and others to develop an understanding of the principles and practices of fisheries, wildlife, and conservation biology. An overview is provided of fish and wildlife biology and natural history and of the general principles applied to managing their populations and habitats. Students interested in the minor should contact the CNR Student Services Office. A total of 23-25 credits are required from the following groups of courses.

Background Courses

Biol 2012—General Zoology (4 cr)
Biol 3407—Ecology (3 cr)
or any ecology course

Fisheries and Wildlife

FW 1001—Orientation in Fisheries, Wildlife, and Conservation Biology (1 cr)
or any natural resources orientation course
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr)
FW 5604W—Fisheries Ecology and Management (3 cr)

Select one of the following:
EEB 4134—Introduction to Ornithology (4 cr)
FW 4129—Mammalogy (4 cr)
FW 4136—Ichthyology (4 cr)

Select one of the following:
FW 4401W—Introduction to Fish Physiology and Behavior (4 cr)
FW 5051—Analysis of Populations (3 cr)
FW 5455—Sustainable Aquaculture (3 cr)
FW 5571—Avian Conservation (3 cr)
FW 5601—Fisheries Analysis (3 cr)

Pre-Veterinary Medicine

Students may fulfill the minimum requirements for admission to the University's College of Veterinary Medicine and other colleges of veterinary medicine by completing a bachelor's degree in fisheries and wildlife within any of the three areas of specialization. Although the requirements may be completed in three years, admission is highly competitive. Completing a bachelor's degree in fisheries and wildlife provides students with additional academic skills and other career opportunities.

Degree Requirements

Students must complete the core curriculum, one of the three areas of specialization, and four additional courses.

Required Courses

The following courses are required in addition to the fisheries and wildlife core requirements and courses in one of three areas of specialization. These courses may be substituted for the electives in the areas of specialization.

BioC 3021—Biochemistry (3 cr)
Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Chemistry Lab I (3 cr)
Phys 1101 and Phys 1102—Introductory College Physics (4 cr, 4 cr)
or Phys 1201 and Phys 1202—Introductory Physics for Premedicine and Biology (5 cr, 5 cr)
or Phys 1301 and Phys 1302—Introductory Physics for Science and Engineering (4 cr, 4 cr)
VPB 2032—General Microbiology with Lab (4 cr)
or Biol 3301—Biology of Microorganisms (5 cr)

Forest Resources

Department of Forest Resources

B.S.

The forest resources curriculum prepares students to plan, implement, and research the management, protection, and sustainable use of forest and related resources, including timber, water, wildlife, recreation, and aesthetic resources. Students select between two tracks: forest management and planning and forest conservation and ecosystem management. Students taking the forest management and planning track receive training in principles and techniques of resource management. Students taking the forest conservation and ecosystem management track focus on conservation issues and strategies and on a broader understanding of ecosystem structure and function. Students should choose one of these tracks as early as possible in their college careers.

Degree Requirements

To complete the degree, students must complete 120 credits. Students must also meet the University's liberal education and writing intensive (W) requirements; for more information, see liberal education on page 31 in this catalog. Courses with an asterisk (*) fulfill both major and liberal education requirements.

All required courses in the major must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Prespectives on Multiculturalism (4 cr)
or EngC 1013—University Writing and Critical Reading: Nature and the Environment (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in a Professional Settings (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)

Mathematical Thinking

Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4cr)
Stat 3011—Statistical Analysis (4 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
Phys 1001—Energy and the Environment (4)
or "B" or better in high school physics
Soil 1125—The Soil Resource (4 cr)
or Soil 2125—Basic Soil Science (4 cr)

Social Sciences and Humanities

NRES 3261W—Economics and Natural Resource Management (3 cr)*
Social science course (3 cr)*
Historical perspective course (3 cr)*
Literature course (3 cr)*
Arts and humanities course (3 cr)*

Professional Required Core Courses

Introductory Courses

FR 1001—Orientation and Information Systems (1 cr)

Resource Assessment

FR 3131—Geographic Information Systems (GIS) for Natural Resources (4 cr)
FR 3218—Assessment and Modeling of Forests (3 cr)
FR 3262—Remote Sensing of Natural Resources and Environment (3 cr)

Forest Management Professional Requirements

FR 5471—Forest Management and Planning (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
or NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
RRM 4232W—Managing Recreational Lands (4 cr)

Management of Vegetation, Wildlife, Soil, and Water Resources

FR 1101—Dendrology: Identifying Forest Trees and Shrubs (3 cr)
FR 3104—Forest Ecology (4 cr)
FR 3411—Silviculture: Managing Forest Ecosystems (4 cr)
FR 3114—Hydrology and Watershed Management (3 cr)
PlPa 3003—Diseases of Forest and Shade Trees (3 cr)
or Ent 4251—Forest and Shade Tree Entomology (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr) (recommended for sophomores)
or FW 5603W—Habitats and Regulation of Wildlife (3 cr) (recommended for juniors or seniors)

Field Traning in Assessment and Biology of Forests

(taught at Cloquet Forestry Center during the summer)
FR 2101—Identifying Forest Plants (1 cr)
FR 2102—Northern Forests Field Ecology (2 cr)
FR 2104—Measuring Forest Resources (1 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

The wildlife handling class offers hands-on experience immobilizing, assessing, and testing large animals. Students interested in conservation biology, zoo management, or wildlife gain a unique perspective from this course.

Forest Management and Planning Track

This track is for students who wish to become directly involved in forest land management or find positions in specialized areas such as resource analysis and planning, timber harvesting, forest protection, or policy development. Graduates may also pursue graduate study to become researchers and teachers or seek advanced positions in administering and managing forest and related natural resources.

All required courses in this track must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Physical and Biological Sciences

Chem 1021—Chemical Principles I (4 cr)
and Chem 1022—Chemical Principles II (4 cr)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)

Introductory Professional Course

WPS 1301—Wood as a Raw Material (3 cr)

Forest Management Professional Requirement

FR 3431—Timber Harvesting and Road Planning (2 cr)

Advanced Training in Assessment and Management of Forest Resources

(taught at Cloquet Forestry Center during May ssession)
FR 5615—Field Remote Sensing and Resource Survey (2 cr)
FR 5611—Field Silviculture (3 cr)
FR 5621—Field Timber Harvesting and Road Planning (2 cr)

Additional Professional Requirements

Students select, with faculty adviser approval, a minimum of 6 additional credits in professional courses chosen from the list below. Courses used to satisfy other requirements may not be used to fill the 6-credit professional requirement.

Ent 4251—Forest and Shade Tree Entomology (3 cr)
FR 3251—Natural Resources in Sustainable International Development (3 cr)
FR 4118—Physiological Ecology of Woody Plants (3 cr)
FR 5142—Tropical Forest Ecology (3 cr)
FR 5153—Forest and Wetland Hydrology (3 cr)
FR 5228—Advanced Assessment and Modeling (3 cr)
FR 5264—Advanced Forest Management Planning (3 cr)
FR 5412—Digital Remote Sensing (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr) (recommended for juniors or seniors)
FW 5604W—Fisheries Ecology and Management (3 cr)
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
or NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
PlPa 3003—Diseases of Forest and Shade Trees (3 cr)
or Ent 4251—Forest and Shade Tree Entomology (3 cr)
Soil 5711—Forest Soils (2 cr)

Electives

Choose 4 credits of electives from any discipline.

Forest Conservation and Ecosystem Management Track

This track is for students who wish to learn the fundamentals of forest resources management while gaining depth in conservation issues and strategies and in the structure and function of ecosystems. Graduates might pursue careers as forest managers and conservationists or seek careers in research, teaching, and technical support for forest and related resource management and conservation.

All required courses in this track must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Physical and Biological Sciences

Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)

Conservation, Ecosystem, Professional, and Scientific Requirements

Students select, with faculty adviser approval, a minimum of 12 additional credits in professional courses chosen from the list below. Courses used to satisfy other requirements may not be used to fill this 12-credit requirement.

Group 1: Plant, Animal, Soil, and Water Science

Biol 3407—Ecology (3 cr)
or EEB 4014W—Ecology of Vegetation (3 cr)
or EEB 4609W—Ecosystem Ecology (3 cr)
FR 3203—Forest Fire and Disturbance Ecology (3 cr)
FR 4118—Physiological Ecology of Woody Plants (3 cr)
FR 5142—Tropical Forest Ecology (3 cr)
FR 5153—Forest and Wetland Hydrology (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr) (recommended for juniors or seniors)
FW 5604W—Fisheries Ecology and Management (3 cr)
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
NRES 3002—Colloquium: Exotic Plants and Animals (1 cr)
NRES 3101—Conserving our Plant Biodiversity (3 cr)
NRES 4061W—Managing Natural Water Quality (3 cr)
NRES 5002—Colloquium: Restoration of Stream Ecosystems (1 cr)
PlPa 3003—Diseases of Forest and Shade Trees (3 cr)
or Ent 4251—Forest and Shade Tree Entomology (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)
Soil 5555—Wetland Soils (3 cr)
Soil 5711—Forest Soils (2 cr)

Group 2: Conservation and Management

Ent 4241—Ecological Risk Assessment (3 cr)
FR 3431—Timber Harvesting and Road Planning (1 cr)
FR 3251—Natural Resources in Sustainable International Development (3 cr)
FR 3601—Applied Tree Improvement (3 cr)
FR 5228—Advanced Assessment and Modeling (3 cr)
FR 5264—Advanced Forest Management Planning (3 cr)
FR 5611—Field Silviculture (3 cr) taught at Cloquet
FR 5615—Field Remote Sensing and Resource Survey (2 cr) taught at Cloquet
FW 5003—Human Dimensions of Biological Conservation (3 cr)
Hort 5071—Landscape and Reclamation Ecology (3 cr)
LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)
NRES 1041—Natural Resources and Raw Materials (3 cr)
NRES 3021—Managing Vegetation Across Ecosystems (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
or NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 3703—Agroforestry in Watershed Management (3 cr)

Electives (9 cr)

Choose 9 credits of electives from courses listed above, from suggested courses listed below, or from any other discipline.

Anth 3041—Ecological Anthropology (3 cr)
EEB 4002—Ecology of Minnesota (2 cr)
EEB 4631—Global Ecology (4 cr)
Geo 3002—Climate Change and Human History (3 cr)
GloS 5301—Environment and Empire (3 cr)
HSci 3244—History of Ecology and Environmentalism (3 cr)
PBio 5412—Plant Physiology
Pol 3872—Global Environmental Cooperation (3-4 cr)
Soil 3221—Soil Conservation and Land-use Management (3 cr)

Forest Resources Minor

The forest resources minor (17 cr) helps students in natural resources and other areas gain deeper understanding of the scientific foundations of forestry, the management of forest resources, and the importance of forest resources to society. Students select from an array of courses in forest assessment, forest biology and management, and forest economics and policy. Students may include a three-week hands-on field session at the Cloquet Forestry Center as part of their minor. Students interested in the minor should contact the CNR Student Services Office.

Minor Core

FR 1101—Dendrology (3 cr)
or FR 2101—Forest Plants (Cloquet) (1 cr)
and FR 2102—Forest Ecology: Field Experience (Cloquet) (2 cr)
and FR 2104—Forest Measurement Techniques (Cloquet) (1 cr)
FR 3104—Forest Ecology (4 cr)
FR 3411—Silvicultural Systems (3 cr)

Additional Required Courses (7 cr)

Students take at least 7 cr selected from the following groups; at least 3 cr must be taken from the first group.

Forest Policy, Management, and Planning

FR 5471—Forest Management and Planning (3 cr)
FR 5501—Urban Forest Management (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
NRES 3261W—Economics and Natural Resource Management (3 cr)
RRM 4232W—Management of Recreational Lands (3 cr)

Resource Assessment

FR 3131—Geographic Information Systems for Natural Resource Analysis (3 cr)
FR 3218—Assessment and Modeling of Forests (3 cr)
FR 3262—Remote Sensing of Natural Resources (3 cr)

Biology and Management of Vegetation, Wildlife, Water, and Soil Resources

Ent 4251—Forest and Shade Tree Entomology (3 cr)
FR 2101—Forest Plants (Cloquet) (1 cr)
and FR 2102—Forest Ecology: Field Experience (Cloquet) (2 cr)
and FR 2104—Forest Measurement Techniques (Cloquet) (1 cr)
FR 3501—Arboriculture (3 cr)
FR 3114—Forest Hydrology and Watershed Management (3 cr)
FR 3431—Timber Harvesting and Road Planning (1 cr)
FR 5142—Tropical Forest Ecology (3 cr)
NRES 4703—Agroforestry: Role in Watershed Management (3 cr)
PlPa 3003—Diseases of Forest and Shade Trees (3 cr)

Natural Resources and Environmental Studies

B.S.

Natural resources and environmental studies is an interdisciplinary major focusing on the use and management of natural resources and the study of the environment. Students enrolled in this major achieve one or more of the following objectives:

- Learn about the interaction between natural resources and modern society, including the social and environmental roles that natural resources play nationally and internationally.
- Prepare for careers in public and private organizations that plan the use and management of natural resources and protection of the environment.
- Prepare for positions in fields such as environmental education, environmental assessment, resource inventory, natural resource planning, environmental protection, sustainable development, policy analysis, water resources, waste management, and natural resource management.
- Prepare for graduate study.

The natural resources and environmental studies curriculum has five areas of concentration from which students choose to complete their degree requirements. Areas of concentration include environmental assessment and monitoring; environmental education; planning, policy, and law; resource conservation and environmental management; and water and soil resources. In addition to the core requirements in each area of concentration, students choose up to 15 credits of "Additional Required Professional Courses" in consultation with their faculty advisers. Students then complete a *Concentration Contract* signed by their faculty adviser listing the additional professional courses on which they have agreed. The completed *Concentration Contract* is filed in the Student Services Office and is used to clear students for graduation.

Degree Requirements

To complete the degree, students must complete 120 credits including required courses in the major, the University's liberal education requirements, and approved writing intensive (W) courses. For more information, see page 31 in this catalog. Courses with an asterisk (*) fulfill both major and liberal education requirements.

Environmental Assessment and Monitoring Concentration

The environmental assessment and monitoring concentration focuses on development of skills for assessing the extent and character of various natural and environmental resources with techniques such as geographic information systems, remote sensing, and quantitative sampling, analysis, and modeling.

All required courses in the concentration must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking

Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
or Biol 2012—General Zoology (4 cr)

The *1999 Gourman Report* ranked the forest resources program #1 in the nation.

Phys 1001—Energy and the Environment (4 cr)
or "B" or better in high school physics
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Select one of the following groups:
Chem 1021—Chemistry Principles I (4 cr)
and Chem 1022—Chemistry Principles II (4 cr)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)

Social Sciences and Humanities
ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*

Additional Required Courses
FR 2101, FR 2102, FR 2104—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Cloquet) (4 cr)
or NRES 3051—Experience and Training in a Field Setting (1-3 cr)
and one of the following:
FR 1101—Dendrology (3 cr)
or EEB 4014W—Ecology of Vegetation (3 cr)
or PBio 4321—Taxonomy of Minnesota Flora (3 cr)
FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
FR 3131—Geographical Information Systems for Natural Resource Analysis (3 cr)
FR 3262—Remote Sensing of Natural Resources (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
NRES 1001—Orientation and Information Systems (1 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
NRES 3000 *or* NRES 3001 *or* NRES 3002 *or* NRES 5002—Colloquium (choose one) (1-2 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 3411—Silviculture Systems (3 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
or FR 3114—Forest Hydrology and Watershed Management (3 cr)
NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Additional Required Professional Courses
12 credits from the following list. Course selections must be made in consultation with a faculty adviser; contract required. Courses from this list may be used to fulfill either required courses or additional required professional courses, not both.)
CSci 1113—Introduction to Programming (3 cr)
EEB 4014W—Ecology of Vegetation (3 cr)
FR 1101—Dendrology (3 cr)
FR 2101, FR 2102, FR 2104—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Cloquet) (4 cr)
FR 3601—Elements of Surveying (1 cr)
FR 3114—Forest Hydrology and Watershed Management (3 cr)
FR 3218—Assessment and Modeling of Forests (3 cr)
FR 5228—Advanced Topics in Assessment and Modeling of Forests (3 cr)
FR 5412—Advanced Remote Sensing (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr)
FW 5604W—Fisheries Ecology and Management (3 cr)
Geog 3511—Introduction to Cartography (3 cr)
Geog 5562—Geographic Information Science and Analytical Cartography (3 cr)
Geog 5563—Advanced Geographic Information Science (3 cr)
NRES 1041W—Natural Resources as Raw Materials (3 cr)
NRES 3051—Experience and Training in a Field Setting (1-3 cr)
NRES 3205—Field Ecology in NRES (4 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 3261W—Economics and Natural Resources Management (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
PBio 4321—Taxonomy of Minnesota Flora (3 cr)
Soil 4021W—Environmental Impact Statements (3 cr)
Soil 4511—Field Study of Soils (1 cr)
Soil 5555—Wetlands Soils (3 cr)

Environmental Education Concentration

The environmental education concentration focuses on skills and knowledge necessary for working in a variety of communication and education fields associated with natural resources and the environment. Emphasis is on environmental issues at local, regional, and global levels; the human dimensions of environmental education; and "best practices" for diverse audiences and teaching and learning in informal settings.

All required courses in the concentration must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking
Math 1142—Short Calculus (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences
Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
or Biol 2012—General Zoology (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Phys 1001—Energy and the Environment (4 cr)
or "B" or better in high school physics
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Social Sciences and Humanities (15 cr)
ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*

Additional Required Courses
FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
FR 5403—Fundamentals of Natural Resource Education (2 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
NRES 1001—Orientation and Information Systems (1 cr)
NRES 1041W—Natural Resources as Raw Materials (3 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
NRES 3000 *or* NRES 3001 *or* NRES 3002 *or* NRES 5002—Colloquium (choose one) (1-2 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 3411—Silviculture Systems (3 cr)
NRES 3051—Experience and Training in a Field Setting (1-3 cr)
or NRES 3205—Field Ecology in NRES (4 cr)
or FR 2101, FR 2102, FR 2104—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Cloquet) (4 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
or NRES 3011W—Ethics and Leadership in Resource Management (3 cr)

NRES 3241W—Natural Resource Policy and Administration (3 cr)
or NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
or FR 3114—Forest Hydrology and Watershed Management (3 cr)
NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
or NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)
NRES 4811—Natural Resources Interpretation (3 cr)
or Rec 5311—Programming Outdoor and Environmental Education (3 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Additional Required Professional Courses

15 credits from the following list. Course selections must be made in consultation with a faculty adviser; contract required.
Agro 4103—World Food Problems (3 cr)
Anth 3041—Ecological Anthropology (3 cr)
ApEc 4611—Resource Development and Environmental Economics (3 cr)
CI 5140—Reflective Teaching and Professional Ethics (3 cr)
CI 5502—Special Topics: Outdoor Science Education (1-8 cr)
CI 5533—Studies in Science Education (4 cr)
CI 5540—Special Topics: Science Education – Principles of Environmental Education
CI 5747—Global and Environmental Education: Content and Practice (3 cr)
Comm 5451—Intercultural Communication Processes (3 cr)
DHA 4482—Residential Environmental Quality (3 cr)
EEB 3361—Visions of Nature: The Natural World and Political Thought (3 cr)
FR 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
Hort 5071—Restoration and Reclamation Ecology (3 cr)
LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)
LA 3204—Landscape Ecology (3 cr)
NRES 3261W—Economics and Natural Resource Management (3 cr)
NRES 4811—Natural Resources Interpretation (3 cr)
Pol 3872—Global Environmental Cooperation (3 cr)
Rec 5301—Wilderness and Adventure Education (3 cr)
Rec 5311—Programming Outdoor and Environmental Education (3 cr)
Rhet 3383—In Search of Nature (3 cr)
Soil 5601—Principles of Waste Management (3 cr)

Planning, Policy, and Law Concentration

The planning, policy, and law concentration focuses on planning and management activities with emphases on environmental, social, and cultural factors. Application areas encompass watershed, landscape, and site planning, and address issues of development, resource protection, land use, and regulation at local, state, and national levels.

Students must select a sub-specialization (track) in either planning or in policy and law.

All required courses in the concentration must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking

Math 1142—Short Calculus (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
or Biol 2012—General Zoology (4 cr)
Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*
Pol 1001—American Democracy in a Changing World (4 cr)*

Additional Required Courses

FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
NRES 1001—Orientation and Information Systems (1 cr)
NRES 1041W—Natural Resources as Raw Materials (3 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
NRES 3000, or 3001, or 3002 or 5002—Colloquium (choose one) (1-2 cr)
NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
or NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 3411—Silviculture Systems (3 cr)
NRES 3051—Experience and Training in a Field Setting (1-3 cr)
or NRES 3205—Field Ecology in NRES (4 cr)
or FR 2101, FR 2102, FR 2104—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Cloquet) (4 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
or FR 3114—Forest Hydrology and Watershed Management (3 cr)
NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
or NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Concentration Tracks

Students must complete either the planning track or the policy and law track in addition to the required courses listed above.

Planning Track in the Planning, Policy, and Law Concentration

Additional Required Professional Courses (9 cr)

FR 1101—Dendrology (3 cr)
FR 3131—Geographical Information Systems for Natural Resources Analysis (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)

Natural resources management was ranked #7 in the nation by the *1999 Gourman Report.*

Select an additional 12 credits from the three groups listed below. At least 3 credits must be chosen from each group. Course selections must be made in consultation with a faculty adviser; contract required.

Social Context for Planning

ApEc 5321—Regional Economic Analysis (3 cr)
Geog 5601—Land Use Planning (3 cr)
PA 5034—Community Analysis and Planning Techniques (1.5 cr)
PA 5251—Strategic Planning and Management (1.5 cr)
PA 5252—Strategy and Tactics in Project Planning and Management (1.5 cr)
RRM 4232W—Management of Recreational Lands (4 cr)

Biological/Physical Context for Planning

FR 3262—Remote Sensing of Natural Resources (3 cr)
Hort 5071—Restoration and Reclamation Ecology (3 cr)
LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)
LA 3204—Landscape Ecology (3 cr)
PA 5241—Environmental Planning (4 cr)
Soil 4021W—Environmental Impact Statements (3 cr)

Ways of Understanding and Mitigating Natural Resource Conflict

ApEc 4311—Tourism Development Principles, Processes and Policies (3 cr)
Geog 3355—Environmental Quality (4 cr)
Geog 5724—Meanings of Place (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
NRES 3261W—Economics and Natural Resources Management (3 cr)
PA 5011—Organizational Analysis, Management and Design (3 cr)
Rhet 3266—Group Process, Team Building, and Leadership (3 cr)
RRM 5259—Visitor Behavior Analysis (3 cr)

Policy and Law Track in the Planning, Policy, and Law Concentration

Additional Required Professional Courses (6 cr)

NRES 3241W—Natural Resource Policy and Administration (3 cr)
NRES 3261W—Economics and Natural Resources Management (3 cr)

Select an additional 12 credits from the three groups listed below. At least one course must be chosen from each group. Course selections must be made in consultation with a faculty adviser; contract required.

Policy Analysis

ApEc 3311—Introduction to Public Policy Analysis (3 cr)
ApEc 5651—Economics of Natural Resource and Environmental Policy (3 cr)
PA 5002—Introduction to Policy Analysis (1.5 cr)
PA 5013—Law and Urban Land Use (3 cr)
Pol 3051—Power and Choice: Who Gets What, When, and Why (3 cr)
Pol 3085—Quantitative Analysis in Political Science (4 cr)

Policy and Economics

ApEc 3001—Applied Micro: Consumers and Markets (3 cr)
ApEc 3006—Applied Macro: Government and the Economy (3 cr)
ApEc 4311—Tourism Development Principles, Processes, and Policies (3 cr)
ApEc 5611—Land and Water Economics (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)

Implications of Policy on Natural Resources Planning and Management

Anth 3041—Ecological Anthropology (3 cr)
FR 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
FR 5146—Dynamics of Global Change (3 cr)
Geog 3361—Land Use, Landscapes and the Law (3 cr)
Geog 5724—Meanings of Place (3 cr)
LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)
PA 5012—The Politics of Public Affairs (3 cr)
Pol 3441—Politics of Environmental Protection (3 cr)
Pol 3872—Global Environmental Cooperation (3 cr)
Pol 4483—Grassroots Politics (3 cr)

Resource Conservation and Environmental Management Concentration

The resources conservation and environmental management concentration focuses on the development of a broad understanding of resource conservation and environmental management principles. Emphasis is on understanding the linkages between society and our environment and the leadership and management skills relevant to environmental management at local, state, and national levels.

All required courses in the concentration must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking

Math 1142—Short Calculus (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
Biol 2012—General Zoology (4 cr)
Chem 1021—Chemistry Principles I (4 cr)
and Chem 1022—Chemistry Principles II (4 cr)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Phys 1001—Energy and the Environment (4 cr)
or "B" or better in high school physics
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*

Additional Required Courses

FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
NRES 1001—Orientation and Information Systems (1 cr)
NRES 1041W—Natural Resources as Raw Materials (3 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
NRES 3000 *or* NRES 3001 *or* NRES 3002 *or* NRES 5002—Colloquium (choose one) (1-2 cr)
NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 3411—Silviculture Systems (3 cr)
NRES 3051—Experience and Training in a Field Setting (1-3 cr)
or NRES 3205—Field Ecology in NRES (4 cr)
or FR 2101, FR 2102, FR 2104—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Cloquet) (4 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 3261W—Economics and Natural Resources Management (3 cr)

NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
or FR 3114—Forest Hydrology and Watershed Management (3 cr)
NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
or NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Additional Required Professional Courses

15 credits required from the following list. Course selections must be made in consultation with your faculty adviser; contract required.

Agro 3203—Environment, Global Food Production and the Citizen (3 cr)
ApEc 1102—Macroeconomics (3 cr)
or Econ 1102—Macroeconomics (4 cr)
ApEc 5611—Land and Water Economics (3 cr)
CE 5591—Environmental Law for Engineers (3 cr)
EEB 4601—Limnology (3 cr)
FR 3131—GIS for Natural Resource Analysis (3 cr)
FR 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
FR 3262—Remote Sensing of Natural Resources (3 cr)
FR 3601—Elements of Surveying (1 cr)
FR 4461—Water Quality: The International Dimension (3 cr)
FW 5411—Aquatic Toxicology (3 cr)
FW 5455—Sustainable Aquaculture (3 cr)
FW 5571—Avian Conservation and Management (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr)
FW 5604W—Fisheries Ecology and Management (3 cr)
Geo 5108—Principles of Environmental Geology (3 cr)
Geog 3361—Land Use, Landscapes, and the Law (3 cr)
Hort 5071—Landscape and Reclamation Ecology (3 cr)
LA 3204—Landscape Ecology (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
NRES 3101—Conservation of Plant Biodiversity (3 cr)
PA 5013—Law and Urban Land Use (3 cr)
PA 5212—Managing Urban Growth and Change (3 cr)
PA 5251—Strategic Planning and Management (1.5 cr)
PlPa 3002—Air Pollution, People and Plants: The Science and the Ethics (3 cr)
Pol 3441—Politics of Environmental Protection (3 cr)
Pol 3872W—Global Environment Cooperation (3 cr)
Pol 4523—Politics of the Regulatory Process (3 cr)
Pol 5872—Global Environmental Politics (3 cr)
PubH 5173—Hazard-Related Exposure to Physical Agents in the Environment (4 cr)
PubH 5200—Environmental Health (2 cr)
RRM 4232W—Management of Recreational Lands (4 cr)
Soil 3221—Soil Conservation and Land-Use Management (3 cr)
Soil 4021W—Environmental Impact Statements (3 cr)
Soil 4511—Field Study of Soils (1 cr)
Soil 5601—Principles of Waste Management (3 cr)
Soil 4601—Soils and Pollution (3 cr)

Water and Soil Resources Concentration

The water and soil resources concentration focuses on the management of water and soil resources to achieve a balance between management practices and resulting water and/or soil quality. Emphasis on informed decision-making; ecological approaches to water resource management; water movement, storage and hydrologic cycles; preventing soil erosion, land degradation and resulting impacts on off-site resources. Students must choose one of the following sub-specializations (tracks): hydrology, soil and water conservation, or water quality.

Hydrology Track in the Water and Soil Resources Concentration

Students completing the hydrology track will be eligible for state and federal certification as hydrologists. They can serve as hydrologists or water resource technicians for a watershed district or other governmental unit or in a private organization.

All required courses in the concentration must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking

Math 1271—Calculus I (4 cr)
Math 1272—Calculus II (4 cr)
Math 2243—Linear Algebra and Differential Equations (3 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
or Biol 2012—General Zoology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
and Chem 1022—Chemical Principles II (4 cr)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Phys 1201—General Physics I (5 cr)
and Phys 1202—General Physics II (5 cr)
or Phys 1101—Introductory College Physics I (4 cr)
and Phys 1102—Introductory College Physics II (4 cr)
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*

Additional Required Core Courses

CE 3502—Fluid Mechanics (3 cr)
FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
FR 3114—Forest Hydrology and Watershed Management (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
Geo 5701—General Hydrogeology (3 cr)
NRES 1001—Orientation and Information Systems (1 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
NRES 3000 *or* NRES 3001 *or* NRES 3002 *or* NRES 5002—Colloquium (choose one) (1-2 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 3411—Silviculture Systems (3 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
or WRS 5101—Water Resources: Individuals and Institutions (3 cr)

Unique opportunities for hands-on learning experiences are available to College of Natural Resources students at the Cloquet Forestry Center in Cloquet, Minnesota.

NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
or CE 4541—Environmental Water Chemistry (3 cr)
NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
or NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)
WRS 5001—Field Methods in Water Resources (Cloquet) (2 cr)
** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Additional Required Professional Courses

12 credits required from the following list. Course selections must be made in consultation with a faculty adviser; contract required.
CE 4501—Hydrologic Design (4 cr)
CE 4512—Open Channel Hydraulics (3 cr)
FR 5153—Forest and Wetland Hydrology (3 cr)
Geo 4601—Limnology (3 cr)
Geo 4701—Geomorphology (3-4 cr)
Soil 5232—Soil Physics: Transport Properties and Processes (3 cr)
Soil 5555—Wetland Soils (3 cr)

Soil and Water Conservation Track in the Water and Soil Resources Concentration

Students completing the soil and water conservation track meet the requirements for certification as soil conservationists with the USDA Natural Resource Conservation Service. They can serve as soil and water conservationists for a watershed district, other governmental units, or in a private organization.

All required courses in the concentration must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking
Math 1142—Short Calculus (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences
Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
or Biol 2012—General Zoology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
and Chem 1022—Chemical Principles II (4 cr)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Phys 1001—Energy and the Environment (4 cr)
or "B" or better in high school physics
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Social Sciences and Humanities
ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*
NRES 3261W—Economics and Natural Resource Economics (3 cr)*

Additional Required Core Courses
FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
FR 3131—Geographic Information Systems for Natural Resource Analysis (3 cr)
FR 3262—Remote Sensing of Natural Resources (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
NRES 1001—Orientation and Information Systems (1 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
NRES 3000 *or* NRES 3001 *or* NRES 3002 *or* NRES 5002—Colloquium (choose one) (1-2 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 3411—Silviculture Systems (3 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
or WRS 5101—Water Resources: Individuals and Institutions (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
or FR 3114—Forest Hydrology and Watershed Management (3 cr)
NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
or NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)
Soil 3221—Soil Conservation and Land Use Management (3)
Soil 3416—Plant Nutrients in the Environment (3 cr)
or Soil 3612W—Soil and Environmental Biology (3 cr)
Soil 4511—Field Soils (3 cr)
Soil 5555—Wetland Soils (3 cr)
WRS 5001—Field Methods in Water Resources (Cloquet) (2 cr)
or NRES 3051—Experience and Training in a Field Setting (1-3 cr)
or NRES 3205—Field Ecology in NRES (4 cr)
** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Water Quality Track in the Water and Soil Resources Concentration

Students completing the water quality track will be prepared for careers in national, state, and local government, consulting or industry. They might begin their careers as water quality technicians for a watershed district or other governmental unit, or in a private organization.

All required courses in the concentration must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking
Math 1142—Short Calculus (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences
Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
or Biol 2012—General Zoology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
CE 4541—Environmental Water Chemistry (4 cr)
or Chem 2101—Introduction to Analytical Chemistry Lecture (3 cr)
and Chem 2111—Introduction to Analytical Chemistry Lab (2 cr)

Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Phys 1001—Energy and the Environment (4 cr)
or Phys 1101—Introductory College Physics I (4 cr)
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*

Additional Required Core Courses

EEB 4601—Limnology (3 cr)
FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
FR 3114—Forest Hydrology and Watershed Management (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
NRES 1001—Orientation and Information Systems (1 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
NRES 3000 *or* NRES 3001 *or* NRES 3002 *or* NRES 5002—Colloquium (choose one) (1-2 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 3411—Silviculture Systems (3 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
or WRS 5101—Water Resources: Individuals and Institutions (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
or NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)
WRS 5001—Field Methods in Water Resources (Cloquet) (2 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Additional Required Professional Courses

12 credits required from the following list. Course selections must be made in consultation with a faculty adviser; contract required.

EEB 4605—Limnology Laboratory (1 cr)
EEB 4607—Plankton Ecology (4 cr)
EEB 4609W—Ecosystem Ecology (3 cr)
Ent 5361—Aquatic Insects (3 cr)
FR 3131—GIS for Natural Resource Management (3 cr)
FR 4461—Water Quality: The International Dimension (3 cr)
FR 5153—Forest and Wetland Hydrology (3 cr)
FW 5411—Aquatic Toxicology (3 cr)
FW 5604W—Fisheries Ecology and Management (3 cr)
NRES 3261W—Economics and Natural Resource Management (3 cr)
NRES 5002—Colloquium—Restoration of Aquatic Ecosystems (1 cr)
Soil 5555—Wetland Soils (3 cr)

Natural Resources and Environmental Studies Minor

This minor enables students in majors such as biology, education, journalism, political science, and others to gain a basic understanding of the principles of the use, management, and protection of natural resources and the environment. A total of 23 credits are required from the following groups of courses. Students interested in the NRES minor should contact the College of Natural Resources Student Services Office to declare the minor.

Core Requirements (13 cr)

NRES 1041—Natural Resources as Raw Materials (3 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
FR 3104—Forest Ecology
or an introductory ecology course (4 cr)
FW 2001—Fisheries, Wildlife, and Conservation Biology (3 cr)

Choose 10 additional credits from the following:

NRES 1001—Orientation and Information Systems (1 cr)
NRES 1002—Freshman Seminar (1-3 cr)
NRES 3000—Colloquium: Natural Resources and Environmental Studies (1 cr)*
NRES 3002—Colloquium: Exotic Plants and Animals (1 cr)*
NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
NRES 3101—Conservation of Plant Biodiversity (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
NRES 3205—Field Ecology in NRES (Cloquet) (4 cr)
NRES 3211—Survey, Measurements, and Modeling in Natural Resources (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 3261W—Economics and Natural Resources Management (3 cr)
NRES 3601—Our Home, Our Environment (3 cr)
NRES 4061W—Water Quality: Management of a Natural Resource (3 cr)
NRES 4062—Advanced Water Quality (3 cr)
NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)
NRES 4395—Natural Resources Planning (4 cr)
NRES 4811—Natural Resources Interpretation (3 cr)

**Note: Only one NRES colloquium course may be applied to the 10 credits of other required classes.*

The College of Natural Resources has an 11 to 1 student-faculty ratio, ensuring personal attention from world-class instructors.

Recreation Resource Management

Department of Forest Resources

B.S.

The recreation resource management curriculum prepares students to plan and manage natural and non-urban recreational land and water, as well as manage the people and organizations that depend on these important resources. The curriculum emphasizes natural and managed non-urban areas; natural resources-oriented recreation programs in public and private sectors; social science aspects of natural resources use; and skills in communication, planning, and management. Students select between two tracks: recreation resource management and resource based tourism. Students taking the recreation resource management track receive training in principles and techniques of resource management; students taking the resource based tourism track receive training in organizational and visitor management, policy, and administration.

Graduates may become directly involved in recreation resource management and play specialized supporting roles in areas such as planning and public relations. Some find employment in fields such as environmental education and interpretation. Students pursuing graduate study may develop careers in teaching or research or seek advanced positions in recreation resource management and administration.

Degree Requirements

To complete the degree, students must complete 120 credits. Students must also complete the University's liberal education and writing intensive requirements; see page 31 of this catalog for more information. Courses with an asterisk (*) fulfill both major and liberal education requirements.

All required courses in the major must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Introductory

FR 1001—Orientation and Information Systems (1 cr)
or NRES 1001—Orientation and Information Systems (1 cr)

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1013—University Writing and Critical Reading: Nature and the Environment (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)

Mathematical Thinking

Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)
or Soc 3811—Basic Social Statistics (4 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
Chem 1011—General Principles of Chemistry (4 cr)
or BioC 2011 Biochemistry for the Agricultural and Health Sciences (3 cr)

Social Sciences and Humanities

NRES 3261W—Economics of Natural Resources Management (4 cr)
Psy 1001—Introduction to Psychology (4 cr)*
or Soc 1001—Introduction to Sociology (3 cr)*
Psy 3201—Introduction to Social Psychology (4 cr)
or Soc 3711—Principles of Social Organization (3 cr)*
or Soc 3411—Understanding Formal Organizations (3 cr)*
or Soc 3721—Principles of Social Psychology (3 cr)*

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Recreation Resource Management Track

This track is for students who wish to develop careers in planning or managing the use of recreational land and water, and for students who plan to pursue graduate study. Graduates may become directly involved in recreation resource management and play specialized supporting roles in areas such as planning and public relations. Graduates may also pursue graduate study to facilitate career advancement or develop a foundation for research and teaching in this area.

Physical and Biological Sciences

Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Required Professional Courses

Resource Assessment

FR 3131—Geographic Information Systems (GIS) for Natural Resources (4 cr)
NRES 3211—Survey, Measurement, and Modeling for Environmental Analysis (3 cr)

Management of Vegetation, Wildlife, Soil, and Water Resources

FR 1101—Dendrology: Identifying Forest Trees and Shrubs (3 cr)
FR 3104—Forest Ecology (4 cr)
or EEB 3001—Ecology and Society (3 cr)
or Biol 3407—Ecology (3 cr)
FR 3114—Hydrology and Watershed Management (3 cr)
or NRES 4061W—Managing Natural Water Quality (3 cr)
NRES 3021—Managing Vegetation Across Ecosystems (3 cr)
or FR 3411—Silviculture: Managing Forest Ecosystems (4 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
or NRES 3101—Conserving our Plant Biodiversity (3 cr)

Policy, Management, and Planning

ApEc 4311—Tourism Development Principles, Processes, Policies (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
or NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
RRM 4232W—Managing Recreational Lands (4 cr)
RRM 5259—Visitor Behavior Analysis (3 cr)

Other Required Professional Courses

Choose one course from each of the three groups.

Group 1: Social and Managerial Sciences

Anth 3041—Ecological Anthropology (3 cr)
ApEc 5321—Regional Economic Analysis (3 cr)
Geog 3361—Land Use, Landscapes, and the Law (3 cr)
Geog 5393—The Rural Landscape (4 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
Rhet 3266—Group Process, Team Building and Leadership (3 cr)
RRM 3101—Native and Heritage Based Tourism (3 cr)

Group 2: Recreation Programming and Management Services

NRES 4811—Natural Resources Interpretation and Communication (3 cr)
Rec 3551—Administration and Finance of Leisure Services (4 cr)
Rec 5191—Commercial Recreation and Tourism (3 cr)
Rec 5301—Wilderness and Adventure Education (3 cr)
Rec 5311—Programming Outdoor and Environmental Education (3 cr)
Rec 5801—Legal Aspects of Sport and Recreation (3 cr)

Group 3: Management of Vegetation, Soil, and Water Resources

FR 2101—Forest Plants (Cloquet) (1 cr)
and FR 2102—Forest Ecology: Field Experience (Cloquet) (2 cr)
and FR 2104—Forest Measurement Techniques (Cloquet) (1 cr)
FR 3262—Remote Sensing of Natural Resources (3 cr)
Geog 5565—Geographical Analysis of Environmental Systems and Global Change (3 cr)
Hort 5071—Restoration and Reclamation Ecology (3 cr)
LA 320 —Landscape Ecology (3 cr)
LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)

Electives

Choose 16 credits in other courses to reach the 120 credits required to graduate. Students should meet with their adviser when choosing these courses.

Resource Based Tourism Track

This track is for students who wish to understand the fundamentals of resource management, but focus on managing the businesses and visitors who depend on these resources for recreation and revenue. Graduates are likely to pursue opportunities developing and managing resource based tourism operations, programs, and visitors in both domestic and international locations. Graduates may also pursue graduate study to facilitate career advancement or develop a foundation for research and teaching in this area.

Physical and Biological Sciences

Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
or Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Policy, Management, and Planning (28 cr)

ApEc 4311—Tourism Development Principles, Processes, Policies (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
NRES 4811—Environmental Interpretation (3 cr)
or Rec 5311—Programming Outdoor and Environmental Education (3 cr)
RRM 3101—Nature and Heritage Based Tourism (3 cr)
RRM 4232W—Managing Recreational Lands (4 cr)
RRM 5259—Visitor Behavior Analysis (3 cr)
or Mktg 3010—Marketing Research (3 cr)
Rec 5191—Commercial Recreation and Tourism (3 cr)
Rec 5801—Legal Aspects of Sport and Recreation (3 cr)
or BLaw 2001—The Legal Environment (3 cr)

Service Management and Marketing (6 cr)

Mktg 3001—Principles of Marketing (3 cr)
BIE 5801—The Business of Tourism (3 cr)
or BIE 5802—Education and Human Resource Development Through Tourism (3 cr)
or Mgmt 3320—Small Business Management (3 cr)

Resources

FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
or EEB 3001—Ecology and Society (3 cr)
FR 3251—Natural Resources in Sustainable International Development (3 cr)

Electives

Choose 28-32 credits in other courses to reach 120 credits required to graduate. Students should meet with their advisor when choosing these courses.

Recommended courses

Comm 5451—Intercultural Communication Process (3 cr)
Fina 3001—Finance Fundamentals (3 cr)
FR 3251—Natural Resources in Sustainable International Development (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
FW 4104—Hunting and Fishing Traditions: Field Sports Reflected in Arts, Literature, and Practice (3 cr)
FW 5003—Human Dimensions of Biological Conservation (3 cr)
Geog 3379—Environment and Development in the Third World (3 cr)
Geog 5724—The Meaning of Place (3 cr)
Geog 3361—Land Use, Landscapes, and the Law (3 cr)
Jour 2301—Principles of Advertising (3 cr)
LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Mgmt 3008—Entrepreneurship and the Smaller Enterprise (3 cr)
Mktg 4030—Selling and Sales Management (3 cr)
Mktg 4040—Buyer Behavior (4 cr)
Mktg 4050—Integrated Marketing Communications (4 cr)
Mktg 4060—Marketing and Distribution Channels (4 cr)
Mktg 4070—International Marketing (2 cr)
MSt 5011—Museum History and Philosophy (3 cr)
MSt 5012—Museum Practices (3 cr)
NRES 1201—Conservation and Management of Natural Resources (3 cr)
NRES 3241W—Natural Resource Policy and Administration (3 cr)
NRES 3011W—Ethics and Leadership in Resource Management (3 cr)
PA 5531—Sustainable Development (3 cr)
Rec 5301—Wilderness and Adventure Education (3 cr)
Soc 4305—Society and the Environment: A Growing Conflict

The advanced water quality class, offered during the May session, provides an intense, 3-week field experience.

Urban and Community Forestry

Department of Forest Resources

B.S.

The urban and community forestry curriculum prepares students for careers in planning and managing vegetation and natural resources in or near urban communities, and for direct involvement in resource management or for specialized supporting roles in areas such as urban planning and environmental education.

Urban forests include areas along streets and in parks, private lands, greenbelts, and open spaces. Urban foresters help communities plan, design, or protect urban and peri-urban forests; supervise tree selection and planting; and design insect control/disease protection and plant health care programs.

Principle employers for graduates in urban and community forestry include city governments, private tree care and arboricultural consulting companies, state and federal forestry agencies, nurseries, and utility companies. Graduates may also be qualified for traditional forestry positions, including those in the federal government.

Degree Requirements

To complete the degree, students must complete 120 credits. Those students going into consulting or private business should choose courses in the forest health and cultural practices of urban forestry. Students interested in managing the urban landscape should concentrate on courses in the management and administration areas.

Students must also complete the University's liberal education and writing intensive (W) requirements; see page 31 in this catalog for more information. Courses with an asterisk (*) fulfill both major and liberal education requirements.

All required courses in the major must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1013—University Writing and Critical Reading: Nature and the Environment (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)

Mathematical Thinking

Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)
or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Biol 2022—General Botany (3 cr)
Chem 1021—Chemical Principles I (4 cr)
and Chem 1022—Chemical Principles II (4 cr)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for Agricultural and Health Sciences (3 cr)
Soil 2125—Basic Soil Science (4 cr)
or Soil 1125—The Soil Resource (4 cr)

Social Sciences and Humanities

NRES 3261W—Economics of Natural Resources Management (4 cr)
Pol 1001—American Democracy in a Changing World (4 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Required Professional Core

Introductory

FR 1001—Orientation and Information Systems (1 cr)

Resource Assessment

FR 3131—Geographical Information Systems (GIS) for Natural Resources (3 cr)
NRES 3211—Survey, Measurement, and Modeling in Natural Resources (3 cr)

Field Training in the Assessment and Biology of Forests

(taught at Cloquet Forestry Center)
FR 2101—Forest Plants (1 cr)
FR 2102—Forest Ecology Field Experience (2 cr)
FR 2104—Forest Measurement Techniques (1 cr)

Management of Vegetation, Wildlife, Soil, and Water Resources

Ent 4251—Forest and Shade Tree Etomology (3 cr)
FR 1101—Dendrology (3 cr)
FR 3104—Forest Ecology (4 cr)
FR 3114—Forest Hydrology and Watershed Management (3 cr)
or NRES 4061—Water Quality: Management of a Natural Resource (3 cr)
FR 3411—Silviculture Systems (3 cr)
FR 3501—Arboriculture (3 cr)
FR 4118—Tree Biology (2 cr)
or Biol 3002—Plant Biology: Function (2 cr)
FR 4501W—Urban Forest Management: Managing Greenspaces for People (4 cr)
Hort 1012—Woody Plant Materials (3 cr)
Hort 4041—Nursery Production and Management I (5 cr)
PlPa 3003—Diseases of Forest and Shade Trees (3 cr)

Economics, Management, and Policy

NRES 3241W—Natural Resource Policy and Administration (3 cr)
RRM 4232W—Managing Recreational Lands (3 cr)
UrbS 3001—Introduction to Urban Studies: The Complexity of Metropolitan Life (3 cr)

Recommended Professional Courses

Anth 3041—Ecological Anthropology (3 cr)
FR 3262—Remote Sensing of Natural Resources (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
FW 5603W—Habitats and Regulation of Wildlife (3 cr)
Geog 3371—Introduction to Urban Geography (3 cr)
Hort 4021—Landscape Design, Implementation, and Management I (4 cr)
LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)
Mgmt 3001—Fundamentals of Management (2 cr)
NRES 3021—Managing Vegetation Across Ecosystems (3 cr)
NRES 3202W—Environmental Conflict Management, Leadership, and Planning (3 cr)
NRES 3703—Agroforestry in Watershed Management (3 cr)
Rhet 3266—Group Process, Team Building, and Leadership (3 cr)
Soc 1001—Introduction to Sociology (3 cr)
Soc 3451—Urban Community (3 cr)
Soil 3416—Plant Nutrients in the Environment (3 cr)
WPS 1301—Wood as a Raw Material (3 cr)

Electives

Choose three credits from any discipline.

Urban and Community Forestry Minor

The urban forestry minor (16 cr) enables students in programs such as education, landscape architecture, horticultural sciences, natural resources, and related areas to understand the science and practice underlying the management of urban and community forests. The minor incorporates fundamental science, arboriculture, forest health, and resource management coursework. Students interested in the minor should contact the CNR Student Services Office.

Minor Core (6 cr)

FR 3501—Arboriculture (3 cr)
or FR 5501—Urban Forest Management (3 cr)
PlPa 3003—Diseases of Forest and Shade Trees (3 cr)
or Ent 4251—Forest and Shade Tree Entomology (3 cr)

Additional Required Courses (10 cr)

Select at least 10 credits from the following list:
FR 3104—Forest Ecology (4 cr)
or FR 2101—Forest Plants (Cloquet) (1 cr)
and FR 2102—Forest Ecology: Field Experience (Cloquet) (2 cr)
and FR 2104—Forest Management Techniques (Cloquet) (1 cr)
FR 3218—Assessment and Modeling of Forests (3 cr)
FR 4118—Tree Biology (2 cr)
Hort 1012—Woody Plant Materials (3 cr)
NRES 3211—Survey, Measurements, and Modeling in Natural Resources (3 cr)
RRM 4232W—Management of Recreational Lands (4 cr)

Wood and Paper Science

Department of Wood and Paper Science

B.S.

The wood and paper science program is for students interested in careers in developing, producing, marketing, and using the many products that flow from forests: paper, wood-based panels, lumber, and furniture as well as chemicals from wood. Coursework emphasizes chemical, physical, and mechanical properties of wood and the newest technologies for converting raw material into products. Students choose from four areas of specialization described below.

Students must also complete the University's liberal education requirements, including the diversified core and designated theme requirements. The environment and international perspectives themes are satisfied automatically in the forest products marketing specialization by completing the required courses. For more information, see Liberal Education in the CNR general information section of this catalog.

For more information about the wood and paper science program and its specializations, contact Joe Massey, Head, Department of Wood and Paper Science at 612-624-7459 or jmassey@forestry.umn.edu.

Forest Products Marketing Specialization

The marketing specialization is for students interested in the marketing, sales, and distribution of forest products. Technical emphasis is on the physical-mechanical nature of wood-based building materials, including lumber, plywood, fiberboard, particleboard, and a wide range of new and emerging composite products. Coursework focuses on marketing principles and analysis, management science, computer applications, and economics. Career opportunities include purchasing and selling of forest products at wholesale and retail levels, technical sales, product promotion, and specialized marketing research.

Degree Requirements

To complete the degree, students must complete 128 credits including required courses in the major, the University's liberal education requirements, and approved writing intensive (W) courses. For more information, see page 31 in this catalog. Courses with an asterisk (*) fulfill both major and liberal education requirements.

All required courses in the specialization must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking

Math 1142—Short Calculus (4 cr)
Stat 3011—Introduction to Statistical Analysis (4 cr)

Physical and Biological Sciences

Biol 1001—Introduction to Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Chem 1021/1022—Chemistry Principles I and II (4 cr ea)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Phys 1101—Introductory College Physics I (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*
ApEc 1102—Principles of Macroeconomics (3 cr)*
or Econ 1102—Principles of Macroeconomics (4 cr)*

Wood and Paper Science

WPS 1001—Wood and Paper Science Professional Orientation (1 cr)
WPS 1002—Application of Computer and Sensor Technology to Problems in Wood and Paper Science (1 cr)
WPS 1301—Wood as a Raw Material (3 cr)
WPS 1303—Wood Structure and Identification (1 cr)
WPS 3305—Fundamentals of Lumber Grading (1 cr)
WPS 3312—Building Materials Estimating (1 cr)
WPS 3332—Introduction to Residential Construction (2 cr)
WPS 4201—Wood Industry Tours (1 cr)
WPS 4301—Statics and Engineering Mechanics (3 cr)
WPS 4303—Wood Deterioration and Preservation (3 cr)
WPS 4304—Wood Drying (2 cr)
WPS 4307—Wood-Base Panel Technology (3 cr)
WPS 4309—Wood-Fluid Relationships (2 cr)
WPS 4355—Mechanics and Structural Design with Wood Products (3 cr)
WPS 4401W—Forest Products Marketing (4 cr)
WPS 5402—Business Markets in the Forest Products Industry (3 cr)

Marketing/Business

Acct 2050—Introduction to Financial Reporting (4 cr)
Acct 3001—Introduction to Management Accounting (2 cr)
BLaw 3058—The Law of Contracts and Agency (4 cr)
Fina 3001—Finance Fundamentals (2 cr)
Mgmt 3001—Fundamentals of Management (2 cr)
Mktg 3001—Principles of Marketing (2 cr)
Mktg 3010—Marketing Research (4 cr)
Mktg 4030—Selling and Sales Management (4 cr)

Additional Required Course

NRES 1041—Natural Resources as Raw Materials (3 cr)

Suggested Electives

Jour 1001—Introduction to Mass Communication (3 cr)
Jour 3201—Principles of Advertising (3 cr)
Mgmt 4002—Managerial Psychology (4 cr)
Mktg 4020—Advanced Logistics and Supply Chain Management (2 cr)
Mktg 4040—Buyer Behavior (4 cr)
Mktg 4050—Integrated Marketing Communications (4 cr)
Mktg 4060—Marketing and Distribution Channels (4 cr)
Mktg 4070—International Marketing (2 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Special Learning Opportunities

Work experiences in summer jobs, internships, and formal work cooperatives are integral components of the student's total education in the marketing specialization. Job opportunities are posted and companies with employment opportunities may schedule interview days in the department. All students enrolled in the specialization are encouraged to participate in this outside employment program. Course credit is given to participation in outside professional employment through enrollment in the department course, WPS 3396—Industrial Internship. Students should consult with their adviser for more information.

All paper science and engineering graduates in the 2001 class had multiple employment offers prior to graduation; those offers provided an average starting salary of $54,000.

In addition to the above, the department course WPS 3301—Wood Industry Tours, systematically examines industry facilities in the region. Conducted during spring break, the course takes students off campus to visit production facilities and meet with leaders in today's wood and paper science profession.

Paper Science and Engineering Specialization

The paper science and engineering specialization provides in-depth training in the basic sciences and engineering in addition to wood and fiber science, pulp and paper and related sciences, and engineering involved in the manufacture, use and application of pulping and papermaking processes. Graduates find careers in process engineering, manufacturing operations, technical sales and services, marketing, plant management, corporate management, and research and development.

Degree Requirements

To complete the degree, students must complete 132 credits including required courses in the major, the University's liberal education requirements, and approved writing intensive (W) courses. For more information, see page 31 in this catalog. Courses with an asterisk (*) fulfill both major and liberal education requirements.

All required courses in the specialization must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
Rhet 3562—Technical and Professional Writing (4 cr)
or EngC 3027—Advanced Expository Writing (4 cr)

Mathematical Thinking

Math 1271—Calculus I (4 cr)
Math 1272—Calculus II (4 cr)
Math 2243—Linear Algebra and Differential Equations (4 cr)
Math 2263—Multivariable Calculus (4 cr)
Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences

Biol 1009—General Biology (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Chemistry Lab (3 cr)
Chem 3501—Physical Chemistry I (3 cr)
Phys 1301—Introductory Physics for Science and Engineering I (4 cr)
Phys 1302—Introductory Physics for Science and Engineering II (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)*
NRES 3241W—Natural Resource Policy and Administration (3 cr)*

Basic Engineering

CE 4502—Water and Wastewater Treatment (3 cr)
ChEn 4001—Material and Energy Balances (4 cr)
ME 3321—Thermodynamics (4 cr)
ME 3322—Heat Transfer and Fluid Flow (4 cr)

Wood and Paper Science

WPS 1001—Wood and Paper Science Profession Orientation (1 cr)
WPS 1301—Wood as a Raw Material (3 cr)
WPS 3396—Industrial Internship (1 cr)
WPS 4301—Statics and Engineering Mechanics (3 cr)
or AEM 2021—Statistics and Dynamics (4 cr)
WPS 4302—Wood Chemistry (3 cr)
WPS 4305W—Pulp and Paper Technology (3 cr)
WPS 4306—Analysis of Production Systems (2 cr)
WPS 4313—Pulp and Paper Process Unit Operations (3 cr)
WPS 4314—Papermaking Processes and Engineering Lab (3 cr)
WPS 4318—Pulp and Paper Process Simulation and Control (3 cr)
WPS 4321—Material Science of Paper (3 cr)
WPS 4322—Biological and Environmental Science of Paper (2 cr)
WPS 4359—Surface, Colloids, and Coating Processes (4 cr)
WPS 4362W—Pulping and Bleaching (3 cr)
WPS 4364—Process Engineering Design (2 cr)

Additional Required Courses

CSci 1107—Introduction to Fortran (3 cr)
or CSci 1113—Introduction to C/C++ (4 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Special Learning Opportunities

Work experiences in summer jobs, internships, and formal work cooperatives are integral components of the student's total education in paper science and engineering. Companies with employment opportunities schedule interview days in the department. All students enrolled in the specialization are eligible to sign up for these interviews. Course credit is given for participation in outside professional employment through enrollment in the department course, WPS 3396—Industrial Internship. Students should consult with their adviser for more information.

In addition to the above, the department course WPS 3301—Wood Industry Tours systematically examines industry facilities in the region. Conducted during spring break, the course takes students off campus to visit production facilities and meet with leaders in today's wood and paper science profession.

Paper Science and Engineering Minor

Complete 14 credits from the following:

WPS 4302—Wood Chemistry (3 cr)
WPS 4305W—Pulp and Paper Technology (3 cr)
WPS 4313—Pulp and Paper Unit Operations (4 cr)
WPS 4314—Papermaking Processes and Process Engineering Laboratory (3 cr)
WPS 4321—Material Science of Paper (3 cr)
WPS 4322—Biological and Environmental Science of Paper (2 cr)
WPS 4359—Surface, Colloids, and Coating Processes (4 cr)
WPS 4362W—Pulping and Bleaching (3 cr)

Forest Products Production Management Specialization

The production management specialization is for students interested in manufacturing, production management, product development, or industrial engineering careers in industries that manufacture lumber, panel products, millwork, furniture, or other wood products. In addition to a strong wood science background, students gain knowledge in industrial engineering, labor management, and economics.

Degree Requirements

To complete the degree, students must complete 128 credits. Students must also complete the University's liberal education requirements, including the diversified core and designated theme requirements. The environment and international perspectives themes are satisfied automatically by completing required courses in the forest products production management specialization. Courses with an asterisk (*) fulfill both major and liberal education requirements. For more information, see page 31 in this catalog.

All required courses in the specialization must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

Mathematical Thinking

Math 1271—Calculus I (4 cr)
Math 1272—Calculus II (4 cr)
Stat 3021—Introduction to Probability and Statistics (3 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Chem 1021/1022—Chemistry Principles I and II (4 cr ea)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Phys 1101—Introductory College Physics I (4 cr)
Phys 1102—Introductory College Physics II (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*
Psy 1001—Introduction to Psychology (4 cr)*

Wood and Paper Science

WPS 1001—Wood and Paper Science Profession Orientation (1 cr)
WPS 1002—Application of Computer and Sensor Technology to Problems in Wood and Paper Science (1 cr)
WPS 1301—Wood as a Raw Material (3 cr)
WPS 1303—Wood Structure and Identification (1 cr)
WPS 3305—Fundamentals of Lumber Grading (1 cr)
WPS 4201—Wood Industry Tours (1 cr)
WPS 4301—Statics and Engineering Mechanics (3 cr)
WPS 4303—Wood Deterioration and Preservation (3 cr)
WPS 4304—Wood Drying (2 cr)
WPS 4306—Analysis of Production Systems (2 cr)
WPS 4307—Wood-Base Panel Technology (3 cr)
WPS 4308—Wood Machining (2 cr)
WPS 4309—Wood-Fluid Relationships (2 cr)
WPS 4355—Mechanics and Structural Design with Wood Products (3 cr)
WPS 4401W—Forest Products Marketing (4 cr)

Industrial Engineering/Operations Management

AgEt 3213—Engineering Principles and Applications (3 cr)
CE 3402—Construction Materials (3 cr)
CMgt 4013—Legal and Ethical Issues in Construction (2 cr)
or CMgt 4030—Construction Safety and Loss Control (2 cr)
IE 4521—Statistics, Quality, and Reliability (4 cr)
HRIR 3021—Human Resource Management and Industrial Relations (2 cr)
ME 3221—Design and Manufacturing I: Engineering Materials and Manufacturing Processes (4 cr)
OMS 3001—Introduction to Operations Management (2 cr)
OMS 3056—Production and Inventory Management (4 cr)

Additional Required Courses

NRES 1041—Natural Resources as Raw Materials (3 cr)

Suggested Electives

Acct 2050—Introduction to Financial Reporting (4 cr)
IE 5541—Project Management (4 cr)
IE 5553—Simulation of Manufacturing Systems (4 cr)
HRIR 3071—Collective Bargaining and Labor Relations (4 cr)
Mgmt 3001—Fundamentals of Management (2 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Special Learning Opportunities

Work experiences in summer jobs, internships, and formal work cooperatives are integral components of the production management specialization. Opportunities for outside employment are posted and students are strongly encouraged to participate. Course credit is given to participation in outside professional employment through enrollment in the department course, WPS 3396—Industrial Internship. Students should consult with their adviser for more information.

In addition to the above, the department course WPS 3301—Wood Industry Tours systematically examines industry facilities in the region. Conducted during spring break, the course takes students off campus to visit production facilities and meet with leaders in today's wood and paper science profession.

Residential Building Science and Technology Specialization

The residential building science and technology specialization is for students interested in issues around the design, construction, and operation of residential buildings. It focuses on critical issues of building performance, including energy efficiency, building durability, and indoor air quality. The program emphasizes applied building science and provides a broad core of disciplines relating to wood-based materials. A complementary core comprises courses in business communication, management, and marketing.

Degree Requirements

To complete the degree, students must complete 128 credits. Students must also complete the University's liberal education requirements, including the diversified core and designated theme requirements. The environment and international perspectives themes are satisfied automatically by completing required courses in the forest products residential building science and technology specialization. Courses with an asterisk (*) fulfill both major and liberal education requirements. For more information, see page 31 in this catalog.

All required courses in the specialization must be taken A-F and completed with a grade of at least C-. See Graduation Requirements in the CNR General Information section for more information.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
or EngC 1012—University Writing and Critical Reading: Perspectives on Multiculturalism (4 cr)
or EngC 1014—University Writing and Critical Reading: Contemporary Public Issues (4 cr)
Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Comm 1101—Introduction to Public Speaking (3 cr)
Rhet 3562W—Technical and Professional Writing (4 cr)
or EngC 3027W—Advanced Expository Writing (4 cr)

The Department of Wood and Paper Science offers a one-week tour of the Great Lakes states' forest products industries during May session.

Mathematical Thinking

Math 1271—Calculus I (4 cr)
Math 1272—Calculus II (4 cr)
Stat 3021—Introduction to Probability and Statistics (3 cr)

Physical and Biological Sciences

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)
or Biol 1009—General Biology (4 cr)
Chem 1021/1022—Chemistry Principles I and II (4 cr ea)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 2011—Biochemistry for the Agricultural and Health Sciences (3 cr)
Phys 1101—Introductory College Physics I (4 cr)
Phys 1102—Introductory College Physics II (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)*
or Econ 1101—Principles of Microeconomics (4 cr)*
ApEc 1102—Principles of Macroeconomics (3 cr)*
or Econ 1102—Principles of Macroeconomics (4 cr)*
Arch 1401—The Designed Environment (3 cr)*

Wood and Paper Science

WPS 1001—Wood and Paper Science Profession Orientation (1 cr)
WPS 1002—Application of Computer and Sensor Technology to Problems in Wood and Paper Science (1 cr)
WPS 1301—Wood as a Raw Material (3 cr)
WPS 3305—Fundamentals of Lumber Grading (1 cr)
WPS 3312—Building Materials Estimating (1 cr)
WPS 3332—Introduction to Residential Construction (2 cr)
WPS 4201—Wood Industry Tours (1 cr)
WPS 4301—Statics and Engineering Mechanics (3 cr)
WPS 4303—Wood Deterioration and Preservation (3 cr)
WPS 4307—Wood-Base Panel Technology (3 cr)
WPS 4309—Wood-Fluid Relationships (2 cr)
WPS 4333—Systems Approach to Residential Construction (2 cr)
WPS 4334W—Advanced Residential Building Science (3 cr)
WPS 4335—Building Testing and Diagnostics (2 cr)
WPS 4355—Mechanics and Structural Design with Wood Products (3 cr)
WPS 4401—Forest Products Marketing (4 cr)

Supporting Courses

Arch 5501—Environment and Material Forces in Architecture (3 cr)
CE 3402—Introduction to Construction Materials (3 cr)
CE 4101W—Project Management (3 cr)
DHA 2402—Residential Technology (3 cr)
DHA 2463—Housing and Community (3 cr)
IE 5531—Engineering Optimization I (4 cr)
HRIR 3021—Human Resource Management and Industry Relations (2 cr)
OMS 3001—Introduction to Operations Management (2 cr)

Additional Required Courses

CSci 1101—Introduction to Computers and Problem Solving (3 cr)
NRES 1041—Natural Resources as Raw Materials (3 cr)

Suggested Electives

BLaw 3058—Law of Contracts and Agency (3 cr)
OMS 3059—Quality Management (4 cr)
PubH 5200—Topics in Environmental Health (2 cr)

** Courses with an asterisk may be used to fulfill both major and liberal education requirements.*

Special Learning Opportunities

Work experiences in summer jobs, internships, and formal work cooperatives are integral components of the student's total education in the residential building science and technology specialization. Job opportunities in this specialization are posted and students are strongly encouraged to participate. Course credit is given to participation in outside professional employment through enrollment in the department course, WPS 3396—Industrial Internship. Students should consult with their adviser for more information.

In addition to the above, the department course WPS 3301—Wood Industry Tours, systematically examines industry facilities in the region. Conducted during spring break, the course takes students off campus to visit production facilities and meet with leaders in today's wood and paper science profession.

School of Nursing

This is the School of Nursing section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Degree Program


POWER!

School of Nursing

General Information

Established in 1909, the University of Minnesota School of Nursing holds the distinction of being the first continuing nursing program on a university campus in the United States. The School of Nursing assumes responsibility for improving nursing care through its programs in nursing education, research, and community service. The School of Nursing offers three degrees: the bachelor of science in nursing, the master of science with a major in nursing, and the doctor of philosophy with a major in nursing.

The School of Nursing is part of the University's Academic Health Center, whose mission is to be a leader in the ethical, innovative, and efficient discovery and dissemination of knowledge to enhance the health and well-being of Minnesota, the nation, and the world.

Admission

Program Changes—Beginning fall 2002, pending Regents approval, the School of Nursing will offer a nursing postbaccalaureate certificate program. The program is designed for people with baccalaureate degrees in areas other than nursing who wish to become nurses. For more details, call the School of Nursing Office of Student Services at 612-624-4454.

Also beginning fall semester 2002, the School of Nursing expands the nursing major to the University of Minnesota Rochester campus. Students complete their nursing coursework in Rochester. For more information, call the School of Nursing at 612-624-4454 or the University of Minnesota Rochester at 507-280-2834.

Junior-level Admission—Fall semester 2003 is the last term that juniors will be admitted to the nursing program for a two-year nursing major. The School of Nursing will begin admitting students at the sophomore level during fall semester 2003 for a three-year nrsing major, and admission for fall 2004 will be available **only** to students entering their sophomore year.

The nursing major builds on a foundation of prerequisite courses in the natural and behavioral sciences. The following prerequisites are applicable only to students entering the program as juniors during the fall of 2002 or 2003.

Content Areas	Minimum Semester Credits
Anatomy and physiology (either combined or separate courses)	6
Biochemistry (preferred) or organic chemistry	3
Cultural anthropology or sociology	3
Freshman writing	3
General psychology	3
Growth and development	3
Microbiology	2
Nutrition	3
Pathophysiology	3
Pharmacology	3
Public health	2
Statistics (upper division preferred)	3

For complete admission information, contact the School of Nursing Office of Student Services at 612-624-4454 or nurseoss@umn.edu, or see the Web site at <www.nursing.umn.edu>.

Sophomore-level Admission—Both sophomores and juniors will be admitted in fall 2003 to complete a three-year nursing major, however, admission for fall 2004 will be available **only** to students entering their sophomore year.

The following prerequisites are applicable to students entering the nursing program as sophomores in fall 2003:

Content Areas	Minimum Semester Credits
Biology	4
General principles of chemistry or biochemistry	3
General psychology	3
Freshman compostition	3
Social/cultural anthropology/comparative religions	3
Nutrition	3
Human growth and development	3
Abnormal phsychology	3
Human anatomy and human physiology (either combined or separate courses)	6
Microbiology	2

Application Deadline—The School of Nursing admits students to the major for fall semester only. Applications are reviewed on a rolling basis. The priority deadline is March 1 and the final deadline is June 1. Students must have all application materials submitted by the priority deadline to be considered. Applications received between March 1 and June 1 will be reviewed on a space-available basis. Any applications received after the final deadline will be considered late and will not be reviewed. These deadlines are for both sophomore- and junior-level admission.

High School Requirements—All University high school preparation requirements must be completed before entering the nursing program, unless an applicant has a degree or has graduated from high school or earned a GED before 1987.

International Students—Nonnative, English-speaking applicants who have lived in the United States for eight years or more, as of the first day of fall semester, need not submit test scores. Nonnative, English-speaking applicants who have lived in the United States for less than eight years, as of the first day of fall semester, must submit a Test of Spoken English (TSE) score of 50 and one of the following:

- Test of English as a Foreign Language (TOEFL) score of 586, computerized format required score of 240

or

- Michigan English Language Assessment battery (MELAB) score of 85

According to the *Gourman Report*, the School of Nursing undergraduate program is ranked 12th in the nation.

Application Procedures—All applicants must complete the School of Nursing B.S.N. application, available at the School of Nursing Office of Student Services, University of Minnesota, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-4454, <www.nursing.umn.edu>).

Applicants currently enrolled at the University must also complete an *Application for Change of College,* available in 200 Fraser Hall or on the Web at <www.onestop.umn.edu/Forms/index.html>.

Applicants enrolled in other educational institutions must also complete an application for admission and return it to the Office of Admissions in 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2008, <http://admissions.tc.umn.edu/>).

Admission Deposit Fee—Applicants admitted to the School of Nursing must pay a non-refundable deposit fee to hold their admission place. This fee will be applied against the student's first semester tuition and fees. If an applicant wishes to declare a financial hardship regarding the deposit fee, a hardship statement may be submitted with the deposit form.

Orientation

All students enrolled in the School of Nursing for their first semester must attend the school's orientation-registration program.

CPR and First Aid—Students who have been admitted to the School of Nursing are required to have current certification in cardiopulmonary resuscitation, at the health professional level, and in standard first aid.

Health—Students who have been admitted to the School of Nursing are required to provide evidence that they have completed a physical assessment examination with appropriate immunizations.

A condition of admission is documentation for required immunizations according to the AHC Policy of Prevention of and Response to the Educational Exposure to Blood Borne Pathogen and Tuberculosis.

Disability Accommodations—For information on performance requirements or disability accommodations, contact the School of Nursing Office of Student Services.

Degrees/Majors

The baccalaureate program prepares outstanding graduates who are skilled in delivering nursing care, able to contribute to the evolving science of nursing, and capable of moving into leadership positions where they can positively influence health care for individuals and groups. Graduates of the program are confident of their contributions to the care of clients, identify with nursing as a profession, and are able to articulate the nurse's role to other disciplines in health care and to the public.

The program is for high-ability, achievement-oriented students and provides a challenging learning environment with innovative approaches to faculty-student relationships and scholarly learning experiences.

Nursing courses include lectures, seminars, laboratories, and clinical practice. Students learn client care in hospitals, clinics, homes, long-term care facilities, and other health care settings. Students provide care to clients with diverse health care problems in real life situations.

Graduate study leading to the M.S. or Ph.D. degree with a major in nursing is available for qualified candidates. For more information, contact the student recruiter, School of Nursing, University of Minnesota, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-4454).

Continuing education programs in nursing foster intellectual curiosity and growth. The school offers a calendar of contemporary, challenging, and flexible learning experiences that use a variety of academic, professional, and community resources.

Honors

The School of Nursing honors program provides academic opportunities that challenge students to perform at their highest level.

Honors students experience the excitement of discovery and the rigor of problem solving in an intellectually stimulating environment. In honors seminars, students discuss issues and questions important to health care and to the role that nurses play. Through honors courses and self-directed clinical and field experiences, students gain depth and breadth in the theory and practice of nursing.

Students admitted to the School of Nursing with a strong academic record will be invited to apply to the honors program. Further criteria for admission include leadership potential, critical thinking skills, communication skills, creativity, perseverance, and self-direction. After completing the curricular and honors requirements, students graduate with Latin honors.

Graduation Requirements

Prospective graduates must submit an application for degree to the One Stop Student Services Center, 200 Fraser Hall, by the deadline specified by that office for application.

To participate in the spring baccalaureate graduation ceremony, students must have completed all Nurs-designated courses. Students who have been approved to participate in the graduation ceremony are not automatically guaranteed degree clearance. To find out if any non-nursing credits are outstanding at the time of the ceremony, check with the School of Nursing.

Professional Licensure

Examinations for state licensure may be taken after all program requirements have been completed and the degree awarded. Applications for examination are available from the Minnesota Board of Nursing, 2829 University Avenue S.E. #500, Minneapolis, MN 55414 (612-617-2270), or from the state in which the examination will be taken. Policies and procedures related to licensure are formulated by boards of nursing; related questions should be directed to the appropriate board. Deadlines established for applications are strictly observed.

Advising

Academic advising for students is provided by their college of enrollment. Students who are admitted to the School of Nursing under pre-nursing status receive their advising from the School of Nursing.

The School of Nursing Office of Student Services hosts monthly information sessions that include a tour of the School of Nursing. Call 612-624-4454.

Nursing students receive academic advising by nursing faculty. Advisers help students with academic concerns as well as with decisions concerning nursing careers and graduate study. They also help students with orientation and in determining how to apply credits to meet graduation requirements.

Student Organizations

Nursing College Board (NCB)—NCB is the official student organization within the School of Nursing. The student body elects board representatives. The board promotes unity among nursing students and provides them with an official mode of communication with faculty, administration, and other members of the University community. Board activities include representing students on School committees and planning School events. NCB is part of the Twin Cities Student Association and has representation in the Minnesota Student Association, Nursing Alumni Society, and Council for Health Interdisciplinary Participation (CHIP).

CHIP—CHIP is dedicated to enhancing the educational experience of University health sciences students, encouraging the exchange of ideas, and opening the lines of communication among students in the Academic Health Center.

The CHIP Student Center is in 1-425 Malcolm Moos Health Sciences Tower (612-625-7100).

Alpha Tau Delta— Alpha Tau Delta, a professional nursing fraternity, was founded in 1921 on the campus of the University of California at Berkeley. The Beta Chapter at the University of Minnesota was chartered in 1927. Alpha Tau Delta is dedicated to developing leadership, maintaining high professional educational standards, providing service to the community, and encouraging mutual helpfulness and understanding among students in the profession. Membership is open to all School of Nursing students.

Sigma Theta Tau International—The international honor society of nursing, Sigma Theta Tau, has a chapter at the University of Minnesota. Installed in 1934, Zeta Chapter is one of the oldest chapters in the country. The honor society recognizes superior achievement and leadership qualities, fosters high professional standards, encourages creative work, and strengthens commitment to the ideals and purposes of the profession. Zeta Chapter sponsors an annual research day, provides grants for research, presents annual awards for nursing excellence and leadership, and organizes programs of interest to its members. The membership selects new members from undergraduate and graduate students nominated by the faculty and from professional nurses in the community nominated by members or faculty.

School of Nursing Alumni Society—All School of Nursing graduates are encouraged to become members of the Alumni Society of the School of Nursing. The Society

- provides a link for alumni to the School of Nursing
- provides opportunities to enhance students' experiences
- provides communication among the School's alumni, faculty, and students about educational trends and developments in nursing
- provides support to the School of Nursing's mission of research, education, and service

Ninety percent of the 2000 School of Nursing alumni passed the Minnesota state nursing licensure exam the first time taken.

Directory

(area code 612)

Administrative Offices

Office of the Dean
5-140 Weaver-Densford Hall,
308 Harvard St., Minneapolis
624-5959

Development Office
5-139 Weaver-Densford Hall,
308 Harvard St., Minneapolis
624-2490

Outreach Office
5-140h Weaver-Densford Hall,
308 Harvard St., Minneapolis
626-4330

Office of Student Services
5-160 Weaver-Densford Hall,
308 Harvard St., Minneapolis
624-4454

Alumni Relations
624-9494

Enrollment Management
624-3108

Recruitment
624-4454

Registration
624-1906

School of Nursing

Degree Program

B.S.N.

The School of Nursing educates students in theoretically based nursing care with emphases on clinical competence, leadership skills, and critical evaluation. The program prepares students to be skilled clinicians who think critically and analytically as they encounter patient needs and health care issues. The school's membership in the University of Minnesota Academic Health Center allows opportunities for nursing and interdisciplinary research and study.

The program is an upper division (junior/senior) sequence of nursing courses spanning four semesters and one May session. Coursework covers concepts of nursing, health, family, ethics, leadership, teaching, learning, and research. Students develop psychomotor skills during laboratory simulations, and they apply classroom learning to patient and family care in clinical settings.

Coursework covers physical assessment, interpersonal communication, professional and leadership issues, research methods, and health care delivery systems. The school contracts with a variety of agencies for use of their facilities for student clinical experiences in settings such as acute care hospitals, public health agencies, residence and long-term care facilities, clinics, child care centers, and schools. These clinical experiences are planned and supervised by faculty members. Nursing major coursework can be completed at the University of Minnesota Twin Cities campus or at the University of Minnesota Rochester campus.

Required Courses

Students must choose the 46-48 credits of prerequisite courses from the following list:

Anth 1003W or GC 1211 or GC 1285W or Soc 1001 or Anth 1005W
BioC 2011 or Chem 2301
InMd 3001 or InMd 3301
EngC 1011 or EngC 1012 or EngC 1013 or EngC 1014 or Rhet 1101 or GC 1421 and GC 1422
FScN 1112
GC 2283W or Nurs 3690 and Nurs 3691
MicB 4001 or FScN 1021 or MicB/VPB 2022 or MicB/VPB 2032
LaMP 4177
Phcl 5100
Phsl 3051 or Phsl 1001
Psy 1001 or GC 1281
Psy 3005W or EPsy 3264 or Stat 3011 or Stat 1001 or GC 1454
Nurs 4000 or PubH 3001

Students must complete 64 credits in the following courses:

Nurs 4100—Introduction to Nursing, Health, and Health Promotion
Nurs 4101—Clinical Practicum: Health and Health Promotion
Nurs 4103—Therapeutic Communication in Health Care
Nurs 4104—Ethical Sensitivity and Reasoning in Health Care
Nurs 4200—Care of Adults with Disruptions I: Physiological Conditions
Nurs 4202—Core Interventions for Nursing Practice
Nurs 4205W—Nursing Theory and Research
or Nurs 4205V—Honors Course: Nursing Theory and Research
Nurs 4210—Care of Adults with Health Disruptions II: Psychiatric Illnesses
Nurs 4300—Family-Centered Nursing Care of Infants, Children, and Adolescents
Nurs 4302—Expanded Interventions for Nursing Practice
Nurs 4306—Health Care Delivery Systems
Nurs 4310—Holistic Care of Childbearing Families
Nurs 4400—Health Care of Populations
Nurs 4401—Health Care of Populations: Clinical Practicum
Nurs 4402—Taking Ethical Action in Health Care
Nurs 4404—Applied Research and Research Utilization
Nurs 4404H—Honors Course: Applied Research and Research Utilization
Nurs 4406W—Leadership and Management for Shaping Professional Nursing Practice
Nurs 4407H—Honors Course: Seeking Solutions to Global Health Issues
Nurs 4410—Critical Care Nursing
or Nurs 4420—Managing Care of Adult Clients With Complex Health Conditions Across the Continuum
Nurs 4501—Critical Care Nursing Practice
or Nurs 4511—Practicum in Managing the Care of Adult Clients With Complex Health Conditions Across the Continuum

Reserve Officers Training Corps
ROTC

This is the ROTC section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Reserve Officers Training Corps
ROTC

General Information

The Reserve Officers Training Corps (ROTC) plays an important role in the national defense framework of our nation. The American tradition of military instruction on civilian college campuses began in 1819 when a former superintendent at West Point established the American Literary, Scientific, and Military Academy, which later became Norwich University. Military instruction soon spread to other institutions—Virginia Military Institute in 1839, the University of Tennessee in 1840, and The Citadel in 1842.

In 1862 the U.S. Congress, foreseeing the dual necessity of creating additional institutions of higher learning as well as providing a means of schooling in the military arts, passed the Morrill Land Grant Act. This act provided money from the sale of government lands to establish colleges and universities and specified that courses in the military arts should be offered at these institutions.

The University of Minnesota opened its doors in 1869 through the benefits made available by the Morrill Act. One of the original nine faculty members was the University's first professor of military science, Major General Richard W. Johnson. For 70 years, on-campus military training and, after 1916, ROTC programs at the University prepared students to enter the Army. In 1939 a Naval ROTC unit was established, and in 1949 an Air Force ROTC program began.

For more than 150 years, on-campus military training and ROTC programs have provided intelligent, well-educated leaders for the nation's defense. In keeping with the typical American concept of the citizen-soldier and civilian control of military forces, the programs produce military officers from all geographic and social strata whose leadership is characterized by initiative, ingenuity, and flexibility. ROTC officers may return to civilian status when they have fulfilled their military obligation or choose to serve as reserve officers. ROTC programs provide leadership resources not only for national defense but also for civilian enterprise.

Programs

At the University of Minnesota, ROTC programs are offered by the U.S. Army, Navy-Marine Corps, and Air Force. ROTC coursework is completed concurrently with degree work so that participants qualify for officer commissions in one of the four military services—Army, Navy, Marine Corps, or Air Force— as they complete requirements for a University degree. ROTC coursework offers students the opportunity to widen their perspective; sharpen their sense of responsibility; develop their ability to organize, motivate, and lead others; and acquire a maturity of judgment that can be a source of strength and self-confidence throughout their careers.

Four- and two-year programs are available, each offering a different approach toward earning a commission for students who meet selection requirements. Four-year programs consist of a basic course and an advanced course. The basic course is taken during the freshman and sophomore years and the advanced course normally comprises the junior and senior years. Two-year programs consist of the advanced course only. Scholarship students entering their sophomore year incur a service commitment; nonscholarship students are obligated to a service commitment once they enter the advanced course.

Curricula

ROTC courses prepare students for military service as junior officers. Students learn to exercise self-discipline, organize time and effort efficiently, perform effectively under stress, analyze and react quickly and with good judgment, and consistently exhibit exemplary military bearing and appearance. Juniors and seniors are placed in positions of command and apply the leadership skills they have developed during their preceding years of ROTC training. Following the final year of practical experience, these men and women are well prepared to assume leadership responsibilities as commissioned officers.

ROTC curricula are administered by the University's Offices of the Executive Vice President and Provost and the Departments of Military Science (Army ROTC), Naval Science (Navy-Marine ROTC), and Aerospace Studies (Air Force ROTC).

Benefits

ROTC scholarship programs provide up to four years (five years under specific circumstances) of subsidized education, paying all tuition costs, instructional fees, and providing a $250 per-semester allotment for textbook expenses. Additionally, scholarship students receive a subsistence allowance of between $250 and $350 per month. Nonscholarship students in their junior and senior years receive the subsistence allowance for a maximum of 20 months. While attending summer training, all ROTC students receive approximately $700 plus housing, travel, and allowances. Students attending summer training to qualify for a two-year program receive the same pay and allowances as ROTC students (see Scholarships on page 258).

Obligations

Students who complete all requirements are commissioned as second lieutenants (Army, Air Force, and Marines) or ensigns (Navy). Upon commissioning, Naval ROTC scholarship students incur a four-year active duty service obligation; nonscholarship students incur a three-year active duty service obligation. Extended commitments to active duty are required for all pilots (eight years after qualification), naval flight officers (six years after qualification), and Nuclear Propulsion Program officers (five years after commissioning). Air Force pilot and navigator program students incur a commitment of 10 and 6 years, respectively, after completing their training; all other Air Force students incur a four-year active duty service commitment (students who receive five years of scholarship incur a five-year commitment). Army students selected for active duty serve for three years; Army scholarship students selected for active duty serve four years. Army students commissioned into the National Guard or Army Reserve serve on active duty for initial schooling and then assume reserve obligations of varying durations.

Admission

The three ROTC programs are open to all students. Young men and women are selected on the basis of their own merits. Certain qualifications and eligibility criteria for enrollment and commissioning must be met, however, as set forth in the laws and regulations that govern the programs. Students who do not meet these criteria may enroll in a course for its educational value but do not receive financial benefits or an officer's commission. To be eligible for admission to a University ROTC program, applicants must

- be full-time college students;
- have reached their 17th birthday by June 30 of the year they plan to enroll;
- be of sound physical condition;
- show evidence of moral integrity, satisfactory scholarship and extracurricular activity, and potential officer capabilities; and
- have no moral or personal convictions that will prevent them from conscientiously bearing arms in support and defense of the U.S. Constitution.

Transfer Students—Students who have participated in ROTC training at another college or university may request transfer if they were honorably released by the first institution and are accepted by a University of Minnesota ROTC program.

Advanced Standing—Students who have participated in ROTC training at another institution may be granted advanced standing for military courses successfully completed.

Veterans—Veterans may take advantage of their military service and experience by seeking advanced placement in a ROTC program. G.I. Bill educational benefits and ROTC benefits may be received concurrently. Army students may receive advanced standing for membership in the National Guard or Army Reserve through the Simultaneous Membership Program. After commissioning, veterans can count their prior service for longevity pay and retirement.

Scholarships

Scholarships are available through national or regional selection systems. High school seniors may compete for four-year scholarships. Completed applications must be submitted no later than November 15 (Army) or January 1 (Air Force and Navy-Marine) for enrollment the following fall semester. College freshmen and sophomores may compete for three- and two-year scholarships.

Students accepted into one of the ROTC nonscholarship programs are normally eligible to compete for the scholarship program after one or two semesters of enrollment. Aptitude for military service and academic performance are major considerations for acceptance. For more information about particular/special scholarship programs, contact the appropriate department.

Student Activities

Each ROTC department offers a wide range of activities for its students. A variety of local and nationally affiliated organizations offer interested and qualified students the opportunity to participate in activities, both on and off campus, that develop their leadership and managerial skills. Social events and athletic competitions, scheduled throughout the school year, round out the activities available.

Department of Military Science

The Department of Military Science conducts the Army Reserve Officers Training Corps (ROTC) program to prepare men and women to serve as second lieutenants in the United States Army. Students serve our nation in one of the three components of the Army—Active, Reserve, National Guard—upon completion of a bachelor or graduate degree and completion of the ROTC program. Students serve in various career fields including the Nurse Corps, Aviation Branch, and Signal Branch to name a few. Students enrolled in Army ROTC have a wide variety of majors and attend the University of Minnesota or one of the program's nine partnership schools in the Twin Cities area.

The Army ROTC program focus is on management and leadership skills development. The core coursework includes 16 to 26 credits in topics such as the art and science of leadership, ethics, values, integrity, honor, problem solving skills, responsibility, basic military skills, military history, physical training, and adventure training. Students register and earn academic credit for Army ROTC courses in the same manner as other elective courses in their college curriculum.

An academic minor in military science is available but is not required.

Programs

Three programs are available in the Department of Military Science for students to earn a commission as a second lieutenant in the United States Army.

Four-Year Program—The four-year program is divided into two parts—the basic course and the advanced course. The basic course is typically completed in the first two years of college. Except for scholarship cadets, the basic course is voluntary and all students are eligible. After completing the basic course, students that meet the physical and academic standards, and have demonstrated leadership potential, contract into the advanced course. The advanced course includes four concurrent semesters

of coursework and the National Advanced Leadership Course (NALC). The NALC is a paid six-week leadership course conducted at Fort Lewis, Washington, during the summer. Typically students attend NALC during the summer after the first year of the advance course.

Three-Year Program—The three-year program is designed for students who want to start ROTC as a sophomore. Students complete the basic course in one year instead of two. This method is referred to as compression. Students completing the basic course as compression students go on to contract in the advanced course as above.

Two-Year Program—The two-year program enables eligible students to contract in the advanced course at the time they are academic juniors or seniors, or graduate students with four semesters remaining before graduation. Eligible students are those with one or more of the following:

- Prior service in the military.
- Member of the National Guard or Reserve with basic training completed.
- Completion of three or more years of Junior ROTC in high school.
- Completion of the Army ROTC Leader's Training Course.

Students that are members of the National Guard or Army Reserve can participate in the Simultaneous Membership Program (SMP), which provides additional income and the opportunity to serve in a leadership position in the student's unit of choice.

Military Science Minor—A military science minor is available through the College of Continuing Education in collaboration with the Department of Military Science. This minor provides students with basic concepts and principles of military science and the art of leadership. Areas of study include citizenship, military history, values, ethics, integrity, honor, responsibility, management, and leadership skills. Students gain practical leadership experience, develop self-discipline, gain confidence, and improve physical stamina—all of which are valuable qualities when applied to service in a military or civilian career.

The military science minor is open only to ROTC cadets pursuing a bachelor's degree from the University and a commission in the United States Army.

To complete the minor, students must complete 20-28 credits of specialized coursework including Mil 3130, 3131, 3140, 3141, four semesters of Military Science Leadership Lab, Hist 3891 (American Military History) and an approved philosophy course.

Benefits

The Department of Military Science offers many benefits to students with or without military experience.

Personal Growth—The Department of Military Science gives students the opportunity to gain confidence, improve self-discipline, and improve physical and mental toughness. The leadership experience gained by completion of the program gives students a marketable asset—leadership.

Scholarships—A wide variety of scholarships are available and application can be made at anytime during the year. Scholarships range from two to four years in duration with extensions possible for high demanding majors such as nursing or engineering. Scholarships provide up to $17,000 per year in tuition and $600 per year for textbooks. Two-year scholarships are available for members of the National Guard and Army Reserve. These scholarships feature continued reserve duty after commissioning and guaranteed branching in the student's unit. Scholarships for two to four years are also available and include duty in the Active Army after commissioning.

Guaranteed Job after Graduation—Upon commissioning, students have a full time job in the Active Army or part time job in the National Guard or Army Reserve. The military obligation of service is eight years after commissioning (four years Active Army and four years in the reserve component, or eight years in the National Guard or Army Reserve). The type of obligation is determined at the time of contracting in the advanced course and is tied to the type of scholarship. Cadets are selected for a specific branch depending on factors such as their interest, academic major, NALC performance rating, and the needs of the Army.

Income—Students contracted in the advanced course and contracted scholarship students receive $250 to $400 per month, depending upon the class, for up to ten months of the year. Students with prior service, SMP cadets, and members of the National Guard or Army Reserve may be eligible for Montgomery GI Bill (MGIB) benefits, financial assistance or reimbursement for tuition, and an additional $350 per month.

For more than 150 years, on-campus military training and ROTC programs have provided intelligent, well-educated leaders for the nation's defense.

Department of Naval Science

The Naval Reserve Officers Training Corps (NROTC) offers the opportunity for qualified young men and women to earn commissions as Navy, Marine Corps, or Navy Nurse Corps officers as they complete requirements for a University degree. The NROTC program is the nation's largest producer of naval officers.

During their four years of college, NROTC students (midshipmen) complete 32 credits of instruction in naval orientation, naval ship systems, seapower and maritime affairs, navigation, shipboard operations, organization, management, leadership, and ethics, plus 120 hours of professional training in military ceremonies, customs, and skills, and various hands-on training opportunities.

Upon receiving a commission, a new Navy ensign usually receives advanced specialty training and then is assigned to duty aboard a surface ship, nuclear-powered submarine, or with an aviation squadron. Newly commissioned Marine Corps second lieutenants attend The Basic School in Quantico, Virginia following graduation. They then choose from several occupational fields, such as infantry, armor, aviation, artillery, intelligence, and engineering. Nurse program graduates are commissioned as Navy Nurse Corps officers and assigned to Navy medical facilities throughout the world.

Student Categories

Students who study and train with NROTC can be classified into three categories.

Scholarship Students—NROTC offers many scholarships. Scholarship students are appointed through an annual national selection process before college admittance or through competition with their peers after entering the NROTC program. Once appointed, students are designated as midshipmen in the Naval Reserve and receive a scholarship that covers all tuition and fees, a per-semester allotment for textbooks, and a subsistence allowance of between $250 to $350 per month for up to 40 months. Upon graduation and commission into the Navy-Marine Corps Reserve, they serve a minimum active duty obligation of four years.

College Program Students—These students are enrolled by the professor of naval science and frequently are "walk-ons" who join the NROTC program from the regular University student population. They are provided with uniforms and naval science textbooks, but pay their own tuition and fees. The college program consists of the basic (freshman and sophomore) and advanced (junior and senior) courses. Advanced course students are selected from the ranks of basic course students. Advanced course midshipmen receive a subsistence allowance of between $300 to $350 per month for up to 20 months. Upon graduation and commission into the Navy-Marine Corps Reserve, they serve a minimum active duty obligation of three years.

College program students may apply for NROTC scholarships based on the professor of naval science's recommendation. Special scholarship opportunities may be available for college program students at various points in the program.

Naval Science Students—Naval science students are associated with the Department of Naval Science for academic instruction only, e.g., for courses in navigation or organization and management. They register and pay fees in the same manner as for other University courses. These students do not wear uniforms, participate in summer training programs, or receive NROTC benefits. However, those who are eligible may apply for enrollment as NROTC college program or two-year scholarship program students.

Programs

The following NROTC programs and scholarship opportunities lead to rewarding careers as officers in the Navy or Marine Corps.

Four-Year Scholarship Program—This program educates and trains qualified young men and women for active duty as reserve officers in the Navy or Marine Corps.

Scholarship recipients are chosen by a national selection board and must be accepted by the University. The application deadline is January 1 for enrollment the following fall semester.

Navy option scholarship students (with the exception of Navy Nurse Corps option midshipmen) must successfully complete one year of calculus by the end of their sophomore year and one year of calculus-based physics by the end of their junior year. Marine Corps option scholarship students have a slightly different sequence of naval science courses and are not required to fulfill the calculus or physics requirements.

Scholarship students are required to complete three summer training periods, for which they receive training pay. After completing naval science requirements and earning a bachelor's degree, students are commissioned as officers in the Navy-Marine Corps Reserve and serve on active duty for a minimum of four years.

Students already enrolled in the college program may apply for the scholarship program if nominated by the professor of naval science and selected by the chief of naval education and training.

Navy Nurse Corps Scholarship—Four-year scholarships are available to students planning to pursue the bachelor of science degree in nursing (B.S.N.). Upon graduation, these students are commissioned as reserve officers in the Navy Nurse Corps. Eligibility and selection procedures are the same as for the regular four-year NROTC scholarship program.

Four-Year College Program—This program is for students who wish to serve their country as reserve officers in the Navy or Marine Corps. Participants are University freshmen selected by the professor of naval science.

There are almost no restrictions on undergraduate academic courses students may choose provided they can be applied to a bachelor's degree. Students must complete the basic (freshman and sophomore) and advanced (junior and senior) naval science course sequences and certain University courses before graduation. College program students are not required to fulfill the calculus and physics requirements that apply to the scholarship program. Instead, they may take any math course of college-level algebra or higher and any physical science course that includes a lab. In addition, students attend a summer training cruise between their junior and senior years.

After graduating and completing their naval science requirements, students are commissioned as ensigns in the Naval Reserve or second lieutenants in the Marine Corps Reserve and serve on active duty for a minimum of three years.

Two-Year Scholarship Program—This program provides the same NROTC benefits to college juniors and seniors as the four-year scholarship program. To qualify, applicants must have a 2.50 cumulative GPA. Navy option applicants must have successfully completed one year of calculus and must complete one year of calculus-based physics before the end of their junior year. Interested students should apply before March 1 of their sophomore year. Selected students must complete a six-week course of instruction at the Naval Science Institute (NSI) in Newport, Rhode Island. Following NSI, students enroll in the NROTC advanced course. Commissioning as a Navy ensign or Marine Corps second lieutenant follows successful completion of the program and carries an obligation to serve four years of active duty.

Two-Year College Program—Students attending or transferring to the University should apply to the two-year college program before March 1 of their sophomore year. Students selected must attend a six-week course of instruction at the Naval Science Institute (NSI) in Newport, Rhode Island.

Upon return to the University, they enroll in the college program advanced course. After graduation and commissioning, students incur a three-year active duty obligation. Any student finishing near the top of the NSI class may be offered a two-year NROTC scholarship. This includes full tuition plus the other scholarship program benefits, and also incurs a four-year active duty obligation.

Naval Science Institute (NSI)—Students selected for either of the two-year programs attend the Naval Science Institute (NSI) in Newport, Rhode Island, following their sophomore year. NSI provides a six-week course of instruction in naval science and professional training. While at NSI, students receive pay, uniforms, room and board, and transportation. Successful completion of NSI qualifies students to enroll in the NROTC advanced course.

Summer Training—NROTC offers exciting training opportunities. Each summer, NROTC midshipmen train around the world at Navy and Marine Corps bases and aboard U.S. Navy and allied foreign navy vessels of all types. Scholarship students participate in four to six weeks of training each summer following their freshman year while college program students attend training during the summer between their junior and senior years.

Cross-Town Agreements—Students who attend the University of St. Thomas or Macalester College are eligible to participate in any of the University of Minnesota NROTC programs and earn commissions as Navy or Marine Corps officers.

Curriculum

The naval science curriculum covers basic seamanship to fleet operations and provides intensive education in the art and science of being a naval officer. All midshipmen learn about the background and meaning of our national and naval traditions and the importance of professional and ethical performance. This awareness, combined with the opportunity to develop and practice basic leadership principles, affords them the inner confidence necessary to effectively lead others and assume the responsibilities of a Navy or Marine Corps officer.

Midshipmen take the course sequence described below. During the second and third years, they take either the Navy or Marine Corps sequence. In addition to the specified courses, students attend NROTC professional training for three hours each week. During the junior and senior years, these sessions emphasize command and leadership skills. NROTC students must also take certain University courses specified by the Navy.

Navy Sequence—First Year

Nav 1000—Professional Training in Naval Science
Nav 1101—Introduction to Naval Science
Nav 1102—Seapower and Maritime Affairs

Navy Sequence—Second Year

Nav 2000—Professional Training in Naval Science
Nav 2201—Ship Systems I (Naval Engineering)
Nav 4401—Leadership and Management I

Navy Sequence—Third Year

Nav 3000—Professional Training in Naval Science
Nav 3301—Navigation I (Piloting and Celestial Navigation)
Nav 3302—Navigation II (Seamanship and Ship Operations)

Navy Sequence—Fourth Year

Nav 4000—Professional Training in Naval Science
Nav 2202—Ship Systems II (Weapons)
Nav 4402—Leadership, Management, and Ethics II

Marine Option—Second Year

Nav 2000—Professional Training in Naval Science
Nav 3310—Evolution of Warfare (can also be taken in third year)

Marine Option—Third Year

Nav 3000—Professional Training in Naval Science
Nav 4410—Amphibious Warfare (can also be taken in fourth year)

Students register for NROTC courses in the same manner as for other courses in their academic programs. These courses carry academic credit and may be used to fulfill University degree requirements. Students who are not in the NROTC program may enroll in a naval science course as an elective with the instructor's consent.

Department of Aerospace Studies

The Air Force ROTC (AFROTC) program enables qualified men and women to work toward commissions as officers in the Air Force while completing requirements for a University degree. Students are commissioned as second lieutenants upon graduation.

The AFROTC curriculum emphasizes development of leadership and communication skills. Students learn ways in which the Air Force supports national policy. Leadership theory and its practical application in directing personnel and programs are emphasized.

AFROTC courses are offered by the Department of Aerospace Studies. Students register for these courses in the same manner as for other University courses.

Programs

AFROTC programs and associated scholarships vary from one to four years in length. The length of the program and scholarship is based on the number of years the student has left until graduation. For example, a high school senior who earns a four-year scholarship joins the four-year program during their freshman year at the University and activates a four-year scholarship. Alternatively, a college senior would join the one-year program and, if qualified, activate a one-year scholarship. Students can join AFROTC at any time throughout the year; typically scholarship activation occurs during the fall term.

ROTC scholarship programs provide up to four years of subsidized education, paying all tuition costs and instructional fees, and providing a per-semester allotment for textbook expenses.

Scholarship boards are held several times a year. The application deadlines for scholarships are:

- High school student application deadline for a four-year scholarship—December 1 of senior year
- College student application deadline for one- to three-year scholarships—February 28 for the primary board; June 1 for a supplemental board

Students do not need to be members of AFROTC to compete and apply for an in-college scholarship, however, they must become members to activate any scholarship.

Students must enroll in aerospace studies classes every semester regardless of the length of the program. In addition, all students must successfully complete a summer field-training encampment prior to commissioning. This training typically takes place during the summer between the students' sophomore and junior years. ***Note:*** The one-year program is not offered every year and is based on the needs of the Air Force. Contact the University AFROTC to find out more about program availability.

Time requirements for AFROTC students vary by year. Freshmen and sophomores typically spend from 3 to 5 hours per week performing ROTC duties, and juniors and seniors typically spend from 5 to 10 hours per week. Duties include attending mandatory classes and maintaining physical fitness; the latter being a student responsibility accomplished at the students' leisure.

The vast breadth of the Air Force and its operations is difficult to portray in the classroom; so Air Force cadets have the opportunity to visit bases for firsthand observation of how the Air Force operates. These trips are frequently made on weekends or scheduled to coincide with school vacation periods. Cadets may be flown by military aircraft to an Air Force base to tour facilities, receive mission briefings, and inspect aircraft and other technical equipment. There are many other opportunities available to cadets that range from free fall parachuting, to piloting a glider aircraft, to visiting Air Force installations in other countries.

Curriculum

Aerospace studies classes provide students with the tools required to become effective leaders in the Air Force. Freshmen and sophomores take a 1-credit survey course each semester to learn the basics of the Air Force and AFROTC (Air 1104 and 1105) and Air Force history (Air 1204 and 1205). Juniors and seniors take a 3-credit survey course each semester to study the traits and characteristics of effective leaders and managers (Air 3301 and 3302) and to examine national security policy and professionalism (Air 3401 and 3402). In addition, all AFROTC students must enroll in the Leadership Laboratory where class lessons are employed by running a cadet organizational structure (Air 1000).

Students taking aerospace studies courses for academic credit only and not enrolled in AFROTC are exempt from the Leadership Laboratory requirement.

Admission

Entry into the last two years of the AFROTC program is competitive. Candidates must

- pass the Air Force Officer Qualifying Test (AFOQT).
- pass an Air Force medical examination.
- have a GPA of 2.00 or higher.
- pass a physical fitness test and meet weight standards.
- complete field training.
- graduate and commission before the age of 35.

Scholarship Age Limit—Students must be under the age of 31 on December 31st of the commissioning year to be eligible for a scholarship. Otherwise, cadets must be commissioned and enter active duty before reaching age 35. Students not eligible for a scholarship due to age restrictions are eligible for a financial incentive.

Benefits

AFROTC offers students a challenging position in the Air Force immediately after graduation in a variety of career fields. All cadets receive uniforms and AFROTC textbooks free throughout the program. All scholarship recipients and all cadets in their last two years of AFROTC receive at least $250 per academic month and may travel on any military aircraft (space-available status). All cadets also have the opportunity for orientation flights aboard Air Force aircraft and visits to Air Force bases.

Active Duty Requirements

Students not programmed for pilot and/or navigator training incur a four-year active duty commitment. Those programmed for pilot and navigator programs incur a commitment of ten and six years active duty, respectively, after completing their training.

Scholarship Programs

AFROTC offers many scholarships. These scholarships may cover full tuition, fees, and books plus a nontaxable monthly allowance of $250-$400 paid directly to the student. Some scholarships are awarded on a competitive basis while others are awarded on a fully qualified basis. Most three- and four-year scholarships are offered on a best-qualified basis. The one- and two-year scholarships are typically offered on a fully qualified basis.

Four-year scholarships are available on a competitive basis to high school seniors. Applications are usually available early each summer, with a deadline of December 1 for enrollment the following fall semester.

Scholarship entitlements and types of scholarships offered vary according to the needs of the Air Force. Students should contact the University AFROTC office to find out if they qualify for a competitive or fully qualified scholarship. More information and scholarship applications are available online at <www.afrotc.com> and/or <www.umn.edu/afrotc>.

Directory

(area code 612)

Military Science (Army ROTC)

Lieutenant Colonel Robert E. Biller, USA
110 Armory Building
15 Church Street S.E.
Minneapolis, MN 55455-0137
626-1584 or 624-7300
E-mail: arotc@umn.edu
<www.tc.umn.edu/arotc>

Naval Science (Navy-Marine ROTC)

Captain Marc T. Stanley, USN
203 Armory Building
15 Church Street S.E.
Minneapolis, MN 55455-0137
625-6677
E-mail: nrotc@umn.edu
<www.umn.edu/nrotc/>

Aerospace Studies (Air Force ROTC)

Colonel Henry J. Gilman, USAF
3 Armory Building
15 Church Street S.E.
Minneapolis, MN 55455-0137
624-2884
E-mail: afrotc@umn.edu
<www1.umn.edu/afrotc/>

The Armory Building is at 15 Church Street S.E., Minneapolis, MN 55455, on the University's East Bank campus.

Institute of Technology

This is the Institute of Technology section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Degree Programs and Minors

Institute of Technology

General Information

For more than a century, the Institute of Technology (IT) has provided education, research, and technology transfer in science and engineering. With 4,500 students enrolled in its undergraduate programs, 1,700 in graduate programs, and 400 faculty, IT's 12 departments and schools and 15 research centers are committed to excellence in all they undertake.

Computer Facilities—IT, in cooperation with the Department of Computer Science's Academic and Distributed Computing, has established a number of computer laboratories for students. These laboratories provide interactive computing using either stand-alone computers and workstations or remote access to central computing facilities, including those of the Minnesota Supercomputer Institute. Laboratories are available to IT students any time during the work day and evening and weekend hours.

Students also have access through their departments to many special-purpose machines, ranging from small tabletop units for data reduction in laboratories to larger models reserved for special projects.

The Department of Computer Science offers a series of courses in Java, FORTRAN, and C++. Discipline-related computing courses are offered in some departments.

Admission

Freshman Admission

The Office of Admissions reviews all applications to determine applicants' potential for academic success. This review process falls into two categories: guaranteed admission or admission by individual review in which freshman applicants whose records do not meet guaranteed admission requirements are evaluated through the Office of Admissions' individual review process. Students who do not meet criteria for guaranteed admission should still apply.

Guaranteed Admission—Students are guaranteed admission to IT as freshmen if they

1. submit a complete application, including all test scores and transcripts, with a $35 application fee by the priority deadline (ACT preferred, SAT accepted; applying early in the senior year in high school strongly recommended).
2. complete high school course preparation requirements. See Freshman Admission in the General Information section of this catalog.
3. meet the ACT or SAT aptitude rating standards below. The following formulas show how to calculate ACT or SAT aptitude rating using high school rank percentile and ACT or SAT test scores. If the aptitude rating falls at or above the number indicated, students are admitted automatically, provided they also meet the other admission standards listed above.

   AAR = High school rank percentile + (2 x ACT composite score)

   SAR = High school rank percentile + (SAT verbal ÷ 10 + SAT math ÷ 10)

   An AAR of at least 135, or SAR of at least 200, guarantees admission. If a student's AAR or SAR is below the automatic admission cutoffs, his or her application qualifies for the Office of Admissions' individual review process.

Note: The AAR and SAR scores above were current for the fall 2002 application period. For official and up-to-date information about the University's admissions policies, procedures, and deadlines, please see the latest edition of the *Undergraduate Application Booklet* available from the Office of Admissions (612-625-2008 or 800-752-1000) or online at <http://admissions.tc.umn.edu>.

Admission by Individual Review—Review considerations may be based on one or more of the following.

- A pattern of steady improvement in academic performance
- A strong college preparatory curriculum (including advanced placement) or a particularly challenging pattern of coursework
- The size of the applicant's high school graduating class
- Extenuating circumstances that have adversely affected the applicant's academic record or preadmission test scores
- Evidence of exceptional achievement or aptitude not reflected in the applicant's academic record or preadmission test scores
- Evidence of exceptional talent or ability in artistic, scholarly, leadership, or athletic performance

College Coursework Evaluation—No college coursework is required for freshman admission. However, applicants who have completed any transferable college work should have at least a 2.70 grade point average (GPA) in transferable credits (in addition to meeting criteria 1-3 above) to qualify for automatic admission. Applications of students with GPAs below 2.70 are individually reviewed.

Appeals—Any student who believes that the circumstances concerning their application need further consideration may submit a written appeal to the Office of Admissions.

Upper Division Admission—Students entering as freshmen or sophomores must apply for admission to the upper division (junior and senior years). New freshmen and sophomores are told upon admission and at orientation what GPA might be required for entry into their desired upper division major field. (For procedure, see Upper Division under Scholastic Policies in this college section.)

Admission Without a Designated Major—Students who want to keep their options open and learn about IT fields before selecting a specific major should indicate "IT Undeclared" on the admission application. They receive advising from the Office of Lower Division Programs until they are admitted to upper division. During that period students can use the many resources available in that office to learn about IT fields. Some of the services include mentors; peer, faculty, industry, and

IT's "cohort" program places new students into teams that take classes together—helping freshmen meet other students, form study groups, and establish friendships.

alumni advisers; special courses; and written materials. These resources provide information about career opportunities in IT's various fields and other colleges and help students avoid the mistake of selecting a major for the wrong reasons.

All students are urged to take advantage of the Industry Adviser and Mentor Programs, through which they can visit selected industries to talk and learn about engineering and science fields with an engineer and/or scientist of their choice. Currently, more than 200 engineers and scientists from Honeywell, 3M, NSP, and many other companies serve as advisers to IT students through this program. Arrangements to participate are made by Web application.

IT undecided students follow the same first-year academic program as that followed by IT students with a specified major.

Advanced Standing Admission (Transfer)

Students who have completed a year or more of college work are considered for admission with advanced standing. Students planning to transfer to IT should be pursuing a lower division engineering, science, or math program. The mathematics, chemistry, physics, and computer science courses required for the preferred major should be mostly completed at the time of application. Admission decisions are based on the overall GPA and grades in science and mathematics. Because demand for some IT programs exceeds available places, applicants are asked to indicate three majors in order of preference. Applications must include recent transcripts from all colleges attended, reflecting all college work attempted (whether satisfactorily completed or not). Applications must also include a high school transcript to show whether the preparation requirements listed have been met.

Most courses transfer routinely. Equivalency for technical courses has been established between IT and most colleges and universities (see <www.it.umn.edu/admissions/transfer/credit.html>). Technical courses in which a D has been earned do not transfer, unless the following course in the sequence was completed with at least a C.

Dual Degree (3/2) Programs—IT has cooperative agreements with a number of public and private colleges. These programs support those who want to combine a strong liberal arts background with study in engineering—and are willing to spend another year or two achieving this goal.

Under one plan a student can complete three years of study at a private college and then transfer to IT for two additional years. At the private college, core college requirements and the pre-engineering core courses in math and science are completed. A bachelor's degree is awarded by both the private college and IT.

The second plan requires completion of a bachelor of arts degree in math or science before coming to the University to work toward a master of science degree in engineering. This typically involves completing some undergraduate engineering coursework. This plan minimizes the amount of undergraduate coursework required. The amount of such coursework will vary by department and area of study. Participating colleges include (in Minnesota) Augsburg College, Bethel College, Concordia College (Moorhead), Gustavus Adolphus College, Hamline University, Macalester College, Moorhead State University, Northwestern College, the College of St. Catherine, Saint Mary's College, St. Olaf College, St. John's University-College of St. Benedict, St. Scholastica, University of St. Thomas; (outside Minnesota) Augustana College, SD; Carroll College, MT; Jackson State University, MS; Luther College, IA; North Central College, IL; North Park College, IL; University of Winnipeg, Manitoba, Canada; University of Wisconsin—La Crosse, WI; University of Wisconsin—River Falls, WI; Whittier College, CA.

Degrees and Programs

Undergraduate Degrees—Each of IT's undergraduate programs provides a rigorous and stimulating education enhanced by close interaction with distinguished research faculty and access to IT's research facilities.

Eighteen degrees are offered:

bachelor of aerospace engineering and mechanics*
bachelor of science in astrophysics
bachelor of biomedical engineering
bachelor of biosystems and agricultural engineering*
bachelor of chemical engineering*
bachelor of science in chemistry
bachelor of civil engineering*
bachelor of computer engineering*
bachelor of science in computer science
bachelor of electrical engineering*
bachelor of geological engineering*
bachelor of science in geology
bachelor of science in geophysics
bachelor of materials science and engineering*
bachelor of science in mathematics
bachelor of mechanical engineering*
bachelor of science in physics
bachelor of science in statistics

** Program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).*

Graduate Degrees—The University of Minnesota is the only institution in the state that offers a full range of graduate programs in mathematics and computer science, the physical sciences, and engineering. Each IT department offers M.S. and Ph.D. degree programs in several areas within its discipline. For detailed information about the various graduate programs, consult the *Graduate School Catalog* <www.catalogs.umn.edu/grad/index.html>.

IT and the Graduate School jointly offer a program leading to the master of engineering (M.E.) degree in any of the engineering disciplines. This program provides advanced preparation in specialized design work for recent graduates in engineering as well as for working engineers who wish to improve their technical capabilities.

The management of technology program is an executive-format graduate program that prepares working engineers and scientists for careers in technology management. It is a part-time, two-year program leading to a master of science degree in the management of technology (M.S.-M.O.T.). Similar professional masters programs are offered in infrastructure systems, manufacturing systems, and software engineering. For more information, contact the Center for the Development of Technological Leadership, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55455 (612-624-5747).

Interdisciplinary Programs—IT students can plan interdisciplinary programs tailored to their specific interests. Although a degree is approved by a single department, students can combine coursework from several departments.

Many interdisciplinary programs are possible. A few examples include acoustics, bioengineering, environmental engineering, nuclear engineering, and transportation. Students should contact their department office or visit 105 Lind Hall for more information.

Premedical Programs—Because there is no prescribed premedical major, some students plan their IT programs as preparation for medical school. The Minnesota medical schools, in Duluth, Minneapolis, and Rochester, give strong preference to applicants who are state residents.

The Minneapolis campus Medical School has approved the following courses to fulfill its premedical requirements.

Biology—Biol 1009 and 3211 and 2005. This sequence is most parallel to MCAT.

Biochemistry—BioC 3021, BioC 4025 (optional lab)

Chemistry—Chem 1021–1022, 2301–2302 and 2311

English and Literature—EngC 1011 and one literature

Calculus—Math 1271

Physics—Physics 1201 and 1202 or 1301 and 1302

Social and Behavioral Sciences and Humanities—Four courses: one course in psychology with the remaining coursework in at least two of the following areas—history, sociology, anthropology, philosophy, comparative studies, music, or art.

All math/science courses must be taken A-F. A-F grading is preferred for all coursework.

Coursework in genetics and upper level statistics is strongly recommended.

Additional academic courses to complete degree requirements.

Prerequisite courses do change occasionally. The Medical School Web sites have the most up-to-date information and can be found at:

Duluth: <http://penguin.d.umn.edu/Admissions/prospectivestudents.htm>

Minneapolis: <www.meded.umn.edu/>

Rochester: <www.mayo.edu/mms/admit.htm>

The CLA Career and Community Learning Center in 135 Johnston Hall has information on U. S. Medical Schools as well as career information about medical and paramedical fields.

For application procedures, students should consult the premedicine adviser in their IT departments.

Minors

IT Management Minor Only

This program is for IT undergraduates who wish to broaden their education by taking management courses. For more information, see the Degree Programs and Minors section.

Information Technology Minor Only

This interdisciplinary minor provides opportunities to students in nontechnical disciplines to supplement their major with courses focused on information technology. For more information, see the Degree Programs and Minors section.

Honors Program

The IT honors program provides special educational experiences to those students who have the ability and motivation to accept an extra challenge. Honors opportunities include a specially designed academic curriculum during the freshman and sophomore years, upper division programs leading to the cum laude degrees, close contact with instructors, opportunities for research, and a variety of elective honors courses, seminars, and colloquia offered in IT and the College of Liberal Arts.

During the freshman year, most lower division honors students take enriched mathematics, physics, and chemistry courses that provide excellent preparation for any IT major. Students also participate in the many social and cocurricular activities initiated by the IT Student Honors Group.

This special lower division academic program continues into the sophomore year offering enough flexibility so students can take the courses they need to pursue any major. For the junior and senior years, each department offers its own upper division honors program consisting of courses, research projects, and honors opportunities leading to the *cum laude* degrees.

Admission to Lower Division Program—Most lower division honors students begin their participation in the honors program in the fall of the freshman year. These students apply and are admitted in their senior year of high school. Selection is based on academic accomplishments in high school, scores on standardized tests, an application essay, and a recommendation usually from a teacher or counselor. The priority application deadline for freshman admission is January 15. Applications may be obtained by contacting the Office of Admissions, 240 Williamson Hall (612-625-2008).

Students with excellent grades in regular courses during the fall of their freshman year may apply to the honors program for spring semester. These students should have taken the appropriate first-semester mathematics and physics courses so they are prepared for the corresponding honors sequences.

Admission to Upper Division Programs—Students about to enter their junior year may apply to the upper division honors program administered through their major department. Admission requirements are set by the individual departments and may be obtained from the department or the IT Honors Office. Previous enrollment in the lower division honors program is not required for participation in upper division honors programs.

Graduation With Honors—Enrollment in the upper division honors program is required for graduation with the honors designations *cum laude, magna cum laude,* and *summa cum laude.* Other graduation criteria include at least two years of University of Minnesota coursework, quality of the grade record, participation in honors opportunities, fulfillment of requirements designated in the major field, and an honors thesis.

IT Honors Office—This office provides academic advising, procedural information, and other college office services to honors students. The address is IT Honors Office, University of Minnesota, 136 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-2800).

Scholastic Policies

Continuation in Sequences—IT students taking the following lower division sequence courses must earn at least a C- each semester to continue in the sequence.

Chem 1021-1022, 2101-2111
Chem 2301, 2302, 2311
EE 2001, 2011
Math 1155, 1271-1272*
Math 1371-1372
Math 1571-1572
Phys 1301, 1302
Phys 2303,** 2601

** To continue in additional mathematics courses (in particular Math 2243 or Math 2263) or sequences, IT students must earn at least a C- in Math 1272, 1372, or 1572.*

*** To continue in physics sequences, IT students must earn at least a C- in Phys 2303.*

IT students must earn at least a C- in all 1xxx and 3xxx math, physics, and chemistry courses, and all courses required by the major.

The University ranks tenth nationally among all U.S. colleges and Universities, public and private, in the number of patents issued to faculty over the past five years.

Upper Division—The upper division corresponds to the junior and senior years.

Freshmen and sophomores must apply for entry and are told at orientation what minimum GPA might be required. Students should file an application in 105 Lind Hall before completing their sophomore year.

Changing Majors—To change majors within IT, students must petition. Forms are available in 105 Lind Hall. A transcript must accompany the petition.

Students who graduate from IT but continue to register for courses will automatically have their status changed to nondegree unless they had previously been admitted to a second (double) major.

To change majors from IT to another college unit or campus within the University, students must apply for transfer through the One Stop Student Services Center, 200 Fraser Hall, as far as possible in advance of the projected transfer. Some units have transfer application deadlines. Students must meet admission requirements of the unit they plan to enter.

Conduct and Discipline

IT assumes that all students who enroll in its programs are serious about their education and expects them to be responsible individuals who demand of themselves high standards of honesty and good personal conduct.

IT expects the highest standards of honesty and integrity in the academic performance of its students. Any act of scholastic dishonesty is regarded as a serious offense, which may result in expulsion. IT defines scholastic dishonesty as submission of false records of academic achievement; cheating on assignments or examinations; plagiarizing; altering, forging, or misusing a University academic record; taking, acquiring, or using test materials without faculty permission; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement. Aiding and abetting a student in an act of scholastic dishonesty is also considered a serious offense.

The IT Student Conduct Committee, composed of faculty and students, hears cases of scholastic dishonesty. When charges are upheld, the student may be placed on disciplinary probation, failed in a course, suspended, or expelled.

A student has the right to a hearing and to appeal any disciplinary action. Copies of the procedures for cases of scholastic dishonesty are available in 105 Lind Hall upon request.

Disciplinary cases that are nonacademic in nature or that involve two or more colleges are referred to the Campus Committee on Student Behavior (612-624-6073).

Professional Registration

Registration as an engineer is a legal requirement for certain kinds of practice. A professional license is required before an individual may use the designation of engineer in any legal connection. Many engineers obtain a license to show their support for legal recognition of the professional standing of the engineer. Many also obtain a license because professional registration may be useful or required in future employment.

The license is awarded in most states to those graduates of an accredited engineering curriculum who have passed examinations in the fundamentals, principles, and practice of engineering and demonstrated their competence by a specified number of years of appropriate experience. The fundamentals of engineering examination covers materials studied in undergraduate curricula. This examination is given in the spring and fall each year and may be taken by students in their senior year. More information and applications may be obtained from 50 Lind Hall or by writing to the Minnesota State Board of Architecture, Engineering, Land Surveying, Landscape Architecture and Interior Design, 133 7th Street E., St. Paul, MN 55101-2333 (651-296-2388).

Advising

Advising for freshmen is coordinated by the Office of Lower Division Programs, 128 Lind Hall (612-624-2890). Every IT freshman is assigned to a team of approximately 100 students. During orientation, freshmen meet with their team adviser and plan their fall schedule. Students on each team take one or more courses together; this encourages the formation of study and support groups. Freshmen must meet with their team adviser at least once each term to discuss their progress and plan their schedule for the following semester.

All lower division students obtain advising through the Office of Lower Division Programs until admission to upper division.

Special Learning Opportunities and Resources

Student Affairs Office—Prospective and current students can discuss any questions or problems with an advising staff member in the Student Affairs Office, 105 Lind Hall (612-624-8504). This office is responsible for admission, orientation, registration, scholastic conduct, institute-wide scholarships, degree requirements and procedures, and related functions. Appointments are encouraged.

Tutors—IT provides peer tutors for students in chemistry, mathematics, physics, and other IT courses. These teaching assistants, selected from junior and senior IT students, are trained, qualified, and willing to assist students one-on-one with problems in IT lower division courses. Tutoring is provided in various locations—in 150 Lind Hall, by appointment in 128 Lind Hall, and in all residence halls.

Mathematics graduate teaching assistants are available in 150 Lind Hall with the undergraduate teaching assistants. In addition, graduate teaching assistants provide tutoring for computer science courses in 4-205 Electrical Engineering/ Computer Science.

For more information about tutors, contact the Office of Lower Division Programs, 128 Lind Hall (612-624-2890).

Paid Learning Opportunities—IT Career Services (ITCS) provides information about off-campus employment related to major or career interests. Many options are available for part-time, summer internship, and cooperative education employment. Students may be eligible for part-time or summer internship opportunities as early as the end of their freshman year. Students entering upper division may be eligible to participate in cooperative education programs offered through their major department. For more information, contact ITCS, 50 Lind Hall (612-624-4090).

IDEAS (Integrated Degrees in Engineering, Arts, and Sciences)—This scholarship program is for undergraduates who integrate degrees from IT and the College of Liberal Arts. IDEAS enriches students' education by exploring how technology and society influence each other and promotes leadership in technology by providing students with educational opportunities for increased breadth and depth in liberal arts, business, and technical management. For more information, contact the IT Student Affairs Office, 105 Lind Hall, (612-624-8504).

Academic Program for Excellence in Engineering and Science (APEXES)—APEXES promotes academic excellence and the increased presence of underrepresented groups (African American, Chicano/Latino, Native American) in engineering and the physical sciences. Through its precollege, undergraduate, and graduate/faculty programs, it promotes diversity in the classroom, laboratory, and workplace to prepare IT students for careers in an ethnically diverse work force.

Working with other IT and University offices, the program offers a variety of academic enrichment programs such as tutoring, learning assessment, career assessment, and study groups. Through collaboration with IT departments and corporate sponsors, APEXES identifies experiences outside the classroom such as internships, cooperative programs, and work teams to expose students to applications in science and engineering. These collaborations also provide merit scholarships for underrepresented students in engineering and the physical sciences who excel academically.

For more information, contact APEXES, 107 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-626-0219; e-mail APEXES@umn.edu).

Program for Women—This program supports women in their pursuit of science and engineering education and careers. Services are provided to women undergraduate and graduate students, transfer and nontraditional students, faculty, technical staff, fellows, and precollege girls.

The program recruits talented women in an attempt to increase the enrollment of women in IT degree programs to levels above national trends. It builds networks for IT women, provides skills and tools for success, and works to improve the climate for women in individual departments. Its outreach efforts focus on encouraging girls to explore and enjoy mathematics and science as well as educating parents, teachers, leaders, and the greater community on their critical roles in supporting girls and women in science and engineering. The program also provides student referral, scholarship and fellowship files, a resource library, networking information, MN-WISE electronic list server, and advocacy.

For more information, contact Program for Women, 107 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-624-1317).

UNITE Instructional Television—About 50 credit courses each semester are offered through UNITE (UNiversity-Industry Television for Education), an instructional television system for continuing education at the employee's workplace. In addition, 25 of these courses are offered by streaming video—live as they happen on campus—or by video-on-demand. These include both upper division and graduate courses as well as specially developed courses and seminars. Classes are held in TV studio classrooms with on-campus students in attendance. The system is interactive, enabling students at all sites to talk with the instructor and take part in class discussions. Participating companies help support the system by paying a fee based on the number of credits for which its employees are enrolled. This fee is separate from tuition, which is paid either by the student or the company, depending on company policy.

For more information, contact the Director, UNITE Instructional Television, 114 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-624-2332).

On-campus Living Experiences for Freshmen in IT—The Explorations in Engineering and Sciences House (IT Explorations) and the Women in Science and Engineering House (WISE) are new IT residential learning environments. These houses create a smaller living-learning environment in which students can benefit from others who have similar academic and career interests in science and/or engineering. Participating students find support from their peers that can enhance their success in the classroom and on campus. Faculty and staff advisers from IT provide guidance during students' first year on campus, on-site academic advising, access to information on career options, and coordinate various social activities such as dinner with professionals, faculty members, and student organizations.

All participants are strongly encouraged to register for IofT 1312—Exploring Careers in Science and Engineering (2 cr). This course can be used as a freshman seminar.

IT Explorations is a co-ed community open to 60 students in Frontier Hall. The WISE House is a female first-year freshman community open to 20 students in Comstock Hall. Contact the IT Student Affairs Office for further information at 612-624-8010 or e-mail kubit001@umn.edu.

International Programs

IT students have hundreds of study abroad programs to choose from. Students can study in or outside their major, study a second language, or study the history and culture of a region. Study in English is possible at various sites including Hong Kong, Sweden, Norway, England, Denmark, Australia and many others. Students may spend a semester, academic year, or May session enhancing their cross-cultural skills, language ability, or professional experience. Each IT department has a list of recommended locations for study abroad. Students can learn more about these options by contacting Susan Kubitschek, 106 Lind Hall, kubit001@umn.edu.

Opportunities in Science and Engineering—Students have access to science and engineering courses through student exchanges at universities in many countries. Many of these opportunities are very affordable and the Global Campus-Study Abroad office offers more than $150,000 in scholarships for study abroad. IT has also been supportive to students with financial need.

Other Information—For information about opportunities through the International Student Exchange Program (ISEP), International Association for the Exchanges of Students for Technical Experience (IAESTE), and Institute for Study Abroad (Butler University, IN) visit the Global Campus-Study Abroad office in 230 Heller Hall. Advisers there can assist you with study and credit options, financial aid, and orientations. For a full listing of study abroad opportunities, see <www.UMabroad.umn.edu/>.

Career Information

IT Career Services (ITCS), 50 Lind Hall (612-624-4090), <www.it.umn.edu/career> provides comprehensive career planning and job search assistance for IT students and alumni.

ITCS helps students explore major and career options. Each semester the office offers IofT 1312, a two-credit career exploration course that identifies how interests, skills, and abilities align with career possibilities, and provides the opportunity to meet professionals working in engineering and science fields.

Institute of Technology graduates and faculty have founded more than 1,000 companies that employ at least 153,000 people worldwide and have more than $20 billion in annual sales.

ITCS provides a variety of services to students seeking part-time jobs, summer internship and cooperative program positions, or permanent jobs after graduation. ITCS hosts on-campus interviewing, posts job opportunities, and helps students learn all aspects of the job search process, including writing résumés and job search correspondence, developing interviewing skills, and learning how to access job and employer information.

The office also supplies information about and applications for the Engineer In Training (EIT) examinations.

Students are encouraged to register with ITCS as early as their sophomore year.

Student Organizations and Activities

Scientists and engineers find that membership in technical or professional societies usually helps their career development. Many of these societies have student chapters at the University. Through them students have the opportunity to participate in activities of the parent society, gain experience in conducting technical meetings, and meet senior members of the societies. In addition, regular membership in the society is facilitated upon graduation and any entrance fee is reduced or waived for former student members.

Professional Societies—Branches of the following national professional societies are maintained at the University of Minnesota by students and faculty: American Chemical Society, American Institute of Chemical Engineers, Society of Physics Students, American Society of Civil Engineers, American Society of Mechanical Engineers, American Society of Agricultural Engineers, American Institute of Aeronautics and Astronautics, American Institute of Industrial Engineers, and Institute of Electrical and Electronic Engineers. Additional professional societies include the Society of Women Engineers, Triangle, Theta Tau, and Alpha Sigma Kappa.

Honorary Scholastic Societies—These IT societies promote the high standards of the engineering profession by conferring memberships, awards, and other honors on undergraduates distinguished for scholastic achievement and for character. The societies normally elect members from the junior and senior classes on the basis of scholarship (as measured by class rank) and character (as judged by peers and faculty). Of these honorary societies, only Tau Beta Pi selects its members from students in all IT undergraduate departments. The others confine their membership to students from a single department: Alpha Epsilon (biosystems and agricultural engineering), Chi Epsilon (civil engineering), Eta Kappa Nu and Kappa Eta Kappa (electrical engineering), Pi Tau Sigma (mechanical engineering), and Sigma Gamma Tau (aerospace engineering and mechanics).

Plumb Bob—A senior honorary leadership and service society, Plumb Bob works to create and maintain a spirit of fellowship and cooperation among IT students and further the interests of IT and the University. Its members are chosen for their character, leadership, and service.

IT Student Board

This board is the executive body of IT students, representing them in matters affecting the general interests of IT and the University.

Student Publications

Two publications are produced by IT students: *IT Connection* (newsletter) and *IT Technolog* (technical magazine). The IT Board of Publications selects editors and business managers and directs the overall policy of the publications. Students are encouraged to participate as publication staff members.

Directory

(area code 612)

Office of the Dean
105 Walter Library
624-2006

Office of the Associate Dean for Student Affairs
106 Lind Hall
624-5091

Office of Lower Division Programs
128 Lind Hall
624-2890

Student Affairs Office (Admissions)
105 Lind Hall
624-8504

Center for the Development of Technological Leadership
510 West Bank Office Building
624-5747

IT Honors Office
136 Lind Hall
625-2800

IT Career Services
50 Lind Hall
624-4090

Academic Program for Excellence in Engineering and Science (APEXES)
107 Lind Hall
626-0219

Departments

Aerospace Engineering and Mechanics
107 Akerman Hall
625-8000

Astronomy
356 Tate Laboratory of Physics
624-0211

Biomedical Engineering
7-105 Basic Sciences and Biomedical Engineering Building
626-8474

Biosystems and Agricultural Engineering
213 Biosystems and Agricultural Engineering Building, St. Paul
625-7733

Chemical Engineering and Materials Science
151 Amundson Hall
625-1313

Chemistry
139 Smith Hall
624-6000

Civil Engineering
122 Civil Engineering Building
625-5522

Computer Science and Engineering
4-192 Electrical Engineering/Computer Science
625-4002

Electrical and Computer Engineering
4-174 Electrical Engineering/Computer Science
625-3300

Geology and Geophysics (Earth Sciences)
108 Pillsbury Hall
624-1333

Mathematics
115 Vincent Hall
625-4848

Mechanical Engineering
1100 Mechanical Engineering
625-0705

Physics
148 Tate Laboratory of Physics
624-7375

Statistics
313 Ford Hall
625-8046

Institute of Technology

Degree Programs and Minors

Aerospace Engineering

Department of Aerospace Engineering and Mechanics

B.A.E.M.

The mission of the bachelor of aerospace engineering and mechanics (B.A.E.M.) program is to produce graduates who are prepared to enter and sustain the practice of aerospace engineering and related fields, or to pursue advanced studies. This mission is consistent with the mission of the University of Minnesota in learning and teaching; and with the mission of the Institute of Technology to provide a rigorous and stimulating education for its undergraduate majors and to provide programs of instruction in engineering that meet nationally accepted standards for practice of the profession of engineering.

Aerospace engineering is a multidisciplinary field that encompasses many areas of science and engineering and plays a major role in the technological advancement of society. As a constantly changing profession, aerospace engineering is concerned with a wide range of problems and the latest technologies. For this reason an aerospace engineer must have a comprehensive fundamental education in mathematics, physical sciences, and engineering sciences. The four-year program leading to the B.A.E.M. provides this broad background. The program is accredited by the Engineering Accreditation Commission of ABET.

Educational objectives of the B.A.E.M. program are to produce graduates:

- with a broad background in aerospace engineering and mechanics, including fluid mechanics, structural mechanics, and aerospace systems.
- who can apply their knowledge of aerospace engineering and mechanics to achieve success in the aerospace industry, related government agencies, and other engineering industries.
- with skills in the essential tools used in aerospace and other industries. These tools include experimental methods, problem-solving techniques, computational methods and engineering design.
- with the ability to both seek out assistance when needed and to learn new skills throughout their careers.
- with the oral and written communication skills needed to successfully work in a modern multidisciplinary environment.
- who can be successful in graduate-level work in engineering, as well as in other professional schools.

The courses required for the B.A.E.M. include significant laboratory and design experiences.

The department offers an optional engineering intern program in the upper division. The program allows students to obtain industrial work experience by alternating semesters (including the summer) of industrial employment with academic studies during their junior and senior years. Prospective participants should contact the intern program director for information in the fall of their sophomore year.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

Students must complete at least 127 credits to graduate, including at least 56 credits in the major. The courses required for the degree are listed below. These include two technical electives selected from IT upper division courses in an area of interest to the student. One additional technical elective must be taken from the list of five courses in the area of solid mechanics and materials. Campus liberal education requirements are to be met through the 15 credits of liberal education courses. The campus writing requirements are met by B.A.E.M. majors by taking two additional writing intensive courses. These courses may also count as liberal education electives. Two required courses, AEM 4602 and AEM 4332, are writing intensive courses, and these complete the requirements for four writing intensive courses where one course is the upper division and one course is in the major.

Required Courses

Lower Division

AEM 2011—Statics
AEM 2012—Dynamics
AEM 2301—Mechanics of Flight

Upper Division

AEM 3031—Deformable Body Mechanics
AEM 4201—Fluid Mechanics
AEM 4202—Aerodynamics
AEM 4203—Aerospace Propulsion
AEM 4301—Spaceflight Dynamics
AEM 4303—Flight Dynamics and Control
AEM 4501—Aerospace Structures
One of AEM 4502, 4511, 4581, 4441, or 4651
AEM 4601—Instrumentation Lab
AEM 4602—Aeromechanics Lab
AEM 4331—Aerospace Vehicle Design I
AEM 4332—Aerospace Vehicle Design II
Two technical electives

Required Courses From Other Programs

Chem 1021—Chemical Principles I
CSci 1113—Programming for Scientists and Engineers
EE 3005, 3006—Fundamentals of Electrical Engineering and Lab
Math 1271,1272 or Math 1371, 1372 or Math 1571H, 1572H—Calculus I, II
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations
Math 2263 or 2374 or 2574H—Multivariable Calculus
MatS 2001—Introduction to Science of Engineering Materials
ME 3324—Introduction to Thermal Science
Phys 1301, 1302, 2503—Introductory Physics I, II, III
Liberal education electives—15 credits

Electives

Restrictions on Upper Division Technical Electives

Three courses (9 credits) of upper division technical electives are required. Generally the elective requirement is met by selecting non-required 3xxx, 4xxx, and 5xxx courses offered by engineering departments. Some courses from mathematics or science departments are also acceptable.

Exceptions and additions to this rule are the subject of this section.

No course equivalent to a course required in the B.A.E.M. program may be used as an elective; no 1xxx science or mathematics course may be used; and no 1xxx engineering course may be used except for one in the special category described below in (b).

a) Elective in the solid mechanics, engineering materials, and composites area: One of five courses, AEM 4502, 4511, 4581, 4441, and 4651 must be taken.

b) Restrictions on use of some courses as technical electives: One of the three technical electives other than the "solids" elective of part (a) above may be replaced by one of the following (if more than one is taken, the extra credits are not counted toward the degree requirements):
   - The second semester of chemistry, Chem 1022
   - A 2xxx mathematics, science, or engineering course (e.g., Ast 2001)
   - A 3xxx computation course (e.g., CE 3101)
   - A 3xxx statistics course (e.g., Stat 3021)

c) Other general restrictions on technical electives:
   - No 1xxx mathematics or natural science course (e.g., Ast 1001) is acceptable.
   - Only one programming course may be used; thus an AEM student will not be given credit toward the degree for more than one course of FORTRAN, Pascal, or C/C++.
   - The following 3xxx engineering courses contain material already covered in required courses and so are not acceptable as technical electives: CE 3502, ME 3322. These are essentially contained in the required course AEM 4201. CE 3202 (surveying) is not suitable.
   - No courses from the Carlson School of Management may be used as technical electives.

Sample Aerospace Engineering Program

Freshman Year

Fall Semester (16 cr)
Chem 1021—Chemical Principles I (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)

Spring Semester (16 cr)
Biol 1001—Introductory Biology I (4 cr)
CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)

Sophomore Year

Fall Semester (17 cr)
AEM 2011—Statics (3 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
MatS 2001—Introduction to the Science of Engineering Materials (3 cr)
Phys 2503—Introductory Physics for Sciences and Engineering III (4 cr)
Liberal education elective (3 cr)

Spring Semester (13 cr)
AEM 2012—Dynamics (3 cr)
AEM 2301—Mechanics of Flight (3 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Liberal education elective (3 cr)

Junior Year

Fall Semester (15 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
AEM 4201—Fluid Mechanics (4 cr)
AEM 4301—Spaceflight Dynamics (3 cr)
EE 3005—Fundamentals of Electrical Engineering (4 cr)
EE 3006—Fundamentals of Electrical Engineering Lab (1 cr)

Spring Semester (16 cr)
AEM 4202—Aerodynamics (4 cr)
AEM 4303—Flight Dynamics and Control (3 cr)
AEM 4501—Aerospace Structures (3 cr)
AEM 4601—Instrumentation Laboratory (3 cr)
Liberal education elective (3 cr)

Senior Year

Fall Semester (17 cr)
AEM 4331—Aerospace Vehicle Design I (3 cr)
AEM 4602—Aeromechanics Laboratory (4 cr)
ME 3324—Introduction to Thermal Science (4 cr)
Technical elective (3 cr)
Liberal education elective (3 cr)

Spring Semester (17 cr)
AEM 4203—Aerospace Propulsion (4 cr)
AEM 4332—Aerospace Vehicle Design II (4 cr)
Technical elective (3 cr)
Solids technical elective (3 cr)
Liberal education elective (3 cr)

Astrophysics

Department of Astronomy

B.S.Astro.P.

An undergraduate program is offered leading to a B.S. in astrophysics. The astrophysics program enables students to develop the skills necessary to tackle complex and ill-defined problems within the physical sciences. The program prepares students for careers in professional astronomy, computational astrophysics, secondary education in the physical sciences, ROTC programs in the Air Force or Navy, data analysis, or laboratory science.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 19 credits in the major.

The astrophysics degree has several different tracks, depending on the area of specialization a student wishes to pursue. Each track has the same core math, physics, and astrophysics requirements. In addition to these core courses, each track requires 16 credits specific to the area of specialization.

The areas of specialization are:

Professional astronomer
Computational astrophysics
Secondary education
Data analysis specialist
Laboratory scientist

Required Courses

(Ast 1011—Exploring the Universe, Honors *is recommended*)
Ast 2001—Astrophysics
Two 4xxx or 5xxx astronomy courses
Ast 4994—Senior Thesis (3 cr minimum)
Math 1271, 1272 or Math 1371, 1372 or Math 1571H, 1572H
Math 2243, 2263 or Math 2373, 2374 or Math 2573H, 2574H
Math 2283, or any Math 3xxx
Phys 1301, 1302 or Phys 1401, 1402
Phys 2503 (or 2403), 2601, 2605
Phys 4001, 4002

Electives—16 credits from the area of specialization or any 3xxx, 4xxx, or 5xxx astronomy, math, chemistry, or physics course

Final Project

A minimum of 3 credits of Ast 4994—Senior Thesis is required for the degree.

Astrophysics Minor

A minor in astrophysics can be earned through the College of Liberal Arts by taking:

Ast 1001 or 1011 (recommended, not required)
Ast 2001 and its prerequisites

Sample Astrophysics Program

Freshman Year

Fall Semester (16 cr)
Ast 1011—Exploring the Universe (4 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Liberal education elective (4 cr)

Spring Semester (16 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Liberal education elective (4 cr)

Sophomore Year

Fall Semester (16 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Phys 2503—Introductory Physics for Sciences and Engineering III (4 cr)
Liberal education elective (8 cr)

Spring Semester (14 cr)
Ast 2001—Introduction to Astrophysics (4 cr)
Math 2374—IT Multivariable Calculus (4 cr)
Phys 2601—Quantum Physics (4 cr)
Phys 2605—Quantum Physics Lab (2 cr)

Junior Year

Fall Semester (16 cr)
Ast 4xxx or 5xxx (4 cr)
Math 2283—Sequences, Series, and Foundations (4 cr)
Phys 4001—Analytical Mechanics (4 cr)
Degree elective (4 cr)

Spring Semester (12 cr)
Ast 4xxx or 5xxx (4 cr)
Phys 4002—Electricity and Magnetism (4 cr)
Degree elective (4 cr)

Senior Year

Fall Semester (15-16 cr)
Ast 4994—Directed Research (3-4 cr)
Degree elective (4 cr)
Liberal education elective (4 cr)
Elective (4 cr)

Spring Semester (16 cr)
Degree elective (4 cr)
Liberal education elective (4 cr)
Elective (4 cr)
Elective (4 cr)

Biomedical Engineering

Department of Biomedical Engineering

B.Bm.E.

The mission of the Department of Biomedical Engineering is to be a pre-eminent biomedical education and research department providing discoveries, inventions, and highly trained scientists and engineers to meet the needs of industry, health care providers, and the self-directed health care market in the community, the region, the nation, and the world.

Biomedical engineers apply the fundamentals of mathematics, physics, chemistry, and biology to solve medically-relevant problems. Areas of interest may include medical device design, fabrication, and testing; prosthesis fabrication; ergonomics and human factors; physiological function monitoring; home health care technology development; biomedical informatics; functional imaging and tomography; biomaterial development and biocompatibility; artificial tissue and organ fabrication; cell- and biomodule-based sensors and therapeutics; gene therapy development; and biomedical microsystems.

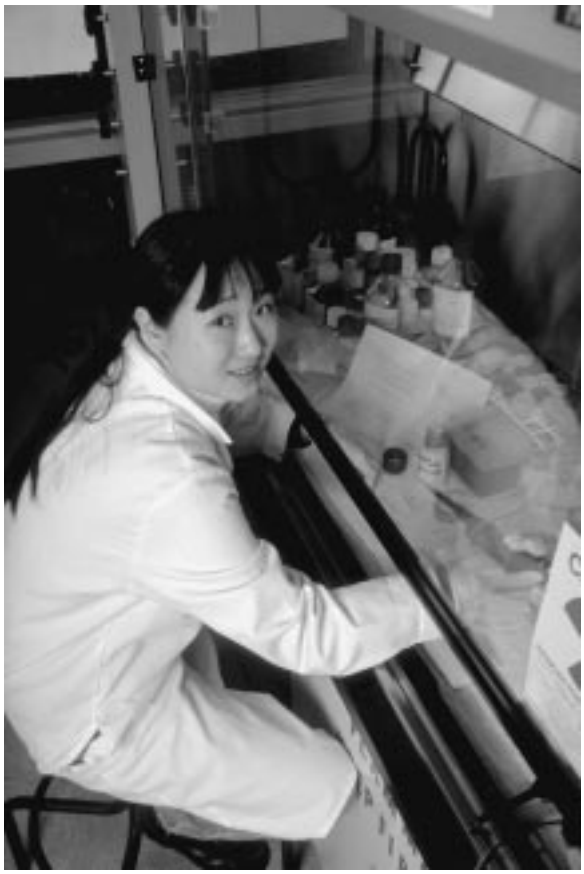
While these examples represent current areas, biomedical engineering continues to change with the rapid advances in biology, medicine, and technology. Therefore, it is a goal of the program to ensure that students have sufficient breadth in their studies to be able to adapt and develop new opportunities and areas of application during their professional career. At the same time the program seeks to promote sufficient depth in one area of biomedical engineering so that students can develop particular expertise in an area of their choosing.

For additional information, contact Director of Undergraduate Studies, Department of Biomedical Engineering, University of Minnesota, 7-105 Basic Sciences and Biomedical Engineering Building, 312 Church Street SE, Minneapolis, MN 55455 (612-626-8474, e-mail bmedus@umn.edu, <www.bme.umn.edu>).

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT.

Degree Requirements

Students must complete at least 125 credits to graduate, including 30 credits in the major. The credit total includes the lower division program of mathematics, physics, chemistry, biology, and liberal education, as well as the upper division program of biomedical engineering, statistics, physiology, and engineering electives.



The Program for Women in IT supports women in their pursuit of education and careers in science and engineering.

Required Courses

BMEn 2501—Cell and Molecular Biology of Biomedical Engineers
BMEn 2601—Biomedical Engineering Undergraduate Seminar I
BMEn 2602—Biomedical Engineering Undergraduate Seminar II
BMEn 3001—Biomechanics
BMEn 3101—Biomedical Transport Processes
BMEn 3201—Bioelectricity and Bioinstrumentation
BMEn 3301—Biomaterials
BMEn 3701—Biomedical Engineering Physiology Laboratory
BMEn 4001W—Biomedical Engineering Design I
BMEn 4002W—Biomedical Engineering Design II
Chem 1021—Chemical Principles I
Chem 1022—Chemical Principles II
Chem 2301—Organic Chemistry I
Chem 3501—Physical Chemistry I
or Biol 3021—Biochemistry
Biol 1009—General Biology
CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers
Math 1271 or 1371—Calculus I
Math 1271 or 1372—Calculus II
Math 2243 or 2373—Linear Algebra and Differential Equations
Math 2263 or 2374—Multivariable Calculus
Phys 1301W—Introductory Physics I
Phys 1302W—Introductory Physics II
Phsl 3061—Principles of Physiology
Stat 3021—Introduction to Probability and Statistics

Electives—24 credits of engineering electives (requires department approval) and 23 credits of liberal education electives (includes Biol 1009)

Sample Biomedical Engineering Program

Freshman Year

Fall Semester (16 cr)
Chem 1021—Chemical Principles I (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371 or 1271—Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)

Spring Semester (16 cr)
Biol 1009—General Biology (4 cr)
Chem 1022—Chemical Principles (4 cr)
Math 1372 or 1272—Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)

Sophomore Year

Fall Semester (15 cr)
BMEn 2501—Cell and Molecular Biology for Biomedical Engineers (4 cr)
BMEn 2601—Biomedical Engineering Undergraduate Seminar I (1 cr)
Chem 2301—Organic Chemistry I (3 cr)
CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers (3 cr)
Math 2263 or 2374—Multivariable Calculus (4 cr)

Spring Semester (17 cr)
BMEn 2602—Biomedical Engineering Undergraduate Seminar II (1 cr)
Chem 3501—Physical Chemistry I (3 cr)
or Biol 3021—Biochemistry (3 cr)
Math 2243 or 2373—Linear Algebra and Differential Equations (4 cr)
Stat 3021—Introduction to Probability and Statistics (3 cr)
Liberal education elective (3 cr)

Junior Year

Fall Semester (15 cr)
BMEn 3001—Biomechanics (4 cr)
BMEn 3101—Biomedical Transport Processes (4 cr)
Phsl 3061—Principles of Physiology (4 cr)
Liberal education elective (3 cr)

Spring Semester (16 cr)
BMEn 3201—Bioelectricity/Bioinstrumentation (4 cr)
BMEn 3301—Biomaterials (4 cr)
BMEn 3701—Biomedical Engineering Physiology Laboratory (2 cr)
Liberal education elective (6 cr)

Senior Year

Fall Semester (18 cr)
BMEn 4001W—Biomedical Engineering Design I (3 cr)
Engineering electives (12 cr)
Liberal education elective (3 cr)

Spring Semester (15 cr)
BMEn 4002W—Biomedical Engineering Design II (3 cr)
Engineering electives (12 cr)

Biosystems and Agricultural Engineering

Department of Biosystems and Agricultural Engineering

B.B.A.E.

The mission of the Department of Biosystems and Agricultural Engineering is to conduct research and educate people to solve engineering problems in agricultural and biological environments.

Biosystems and agricultural engineers integrate engineering and biology to design efficient, economical processes to improve the quality and safety of food products for consumers; protect and enhance the environment through design of sustainable practices to maintain and improve soil, water, and air quality; design efficient, profitable food production systems that protect the environment, humans, plants, and animals; and design safe, efficient machines and processes for biological systems.

Educational objectives for the program are to produce graduates:

- with a broad fundamental engineering background including mathematics, physical science, biological science, engineering science, and computational skills needed for their future practice of biosystems and agricultural engineering.
- with the skills necessary to carry out an effective design process including the ability to think creatively, work cooperatively, formulate problems, synthesize information, develop and evaluate alternatives, implement solutions, and communicate effectively at all stages of the process.
- with the ability to address issues of ethics, safety, professionalism, and social and economic impacts in engineering practice and design.
- with specific abilities to pursue careers that integrate engineering and biology to design efficient, economical systems to produce and deliver high quality, safe food to consumers; to design sustainable systems that protect the environment, humans, plants, and animals; and to design safe and efficient machines, processes, and practices for biological systems.
- who have opportunities to develop in-depth background in one of the following areas of emphasis:

  Bioprocessing and Food—design and develop systems for processing agricultural and biological materials to produce important products such as foods or pharmaceuticals.

  Environment—design and develop systems to preserve and protect agricultural and natural resources including soil, water, and air.

  Machinery Systems—design and develop systems for production and processing of food and other biological materials.

The biosystems and agricultural engineering curriculum emphasizes the physical, biological, and engineering sciences and engineering design. Students also study communications, social science, and humanities to provide a liberal education and prepare to work effectively with professionals in many disciplines. The program provides students with a background for continued professional growth and prepares them to contribute to an ever-changing society.

The curriculum includes emphases in environment, machinery systems, and bioprocessing and food. Students, with the assistance of an adviser, plan a curriculum tailored to their individual interests in one of these three emphases.

Engineering internships are available to supplement classroom instruction by providing practical education and experience with an employer. Students may begin their internships in the summer following their first year.

The biosystems and agricultural engineering program is accredited by the Accreditation Board for Engineering and Technology (ABET).

Liberal education requirements are the same for all students on the Twin Cities campus. Students must satisfy both the diversified core and designated theme requirements.

For additional information, contact Roger Ruan, Department of Biosystems and Agricultural Engineering, 213 Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108. E-mail ruanx001@umn.edu; fax 612-624-3005.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

Students must complete at least 128 credits to graduate, including 29 credits in the major. Non-BAE credits include 19 credits of engineering courses; 7 credits of composition; 48 credits of mathematics, chemistry, physics, biology, statistics, and computer programming; and credits needed to fulfill the University's liberal education requirements.

Required Courses

BAE 1011—BAE Orientation (1 cr)
BAE 2113—Introduction to Design (3 cr)
BAE 3013—Engineering Principles of Molecular and Cellular Processes (3 cr)
BAE 3023—Engineering Principles of Soil-Water-Plant Processes (3 cr)
BAE 4013—Transport in Biological Systems (4 cr)
BAE 4023—Instrumentation and Control for Biological Systems (3 cr)
BAE 4112-4122—Senior Design I-II (4 cr)
Plus 9 credits (three courses) of BAE in an emphasis (For a designated emphasis, at least two courses must be in that emphasis.)

Environment
BAE 4523—Water Management Engineering (3 cr)
BAE 4533—Agricultural Waste Management Engineering (3 cr)
BAE 5513—Watershed Engineering (3 cr)

Machinery Systems
BAE 4313—Design of Machine Systems (3 cr)
BAE 4323—Machinery Elements (3 cr)

Bioprocessing and Food
BAE 4713—Bioprocess Engineering (3 cr)
BAE 4723—Food Process Engineering (3 cr)

Required Courses From Other Programs

AEM 2021—Statics and Dynamics (4 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
Biol 1009—General Biology (4 cr)
CE 3502—Fluid Mechanics (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
EE 3005—Fundamentals of Electrical Engineering (4 cr)
EngC 1011—University Writing and Critical Reading
or Rhet 1101—Writing to Inform and Persuade (4 cr)
Math 1271 or 1371 or 1571H—Calculus I (4 cr)
Math 1272 or 1372 or 1572H—Calculus II (4 cr)
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations (4 cr)
Math 2263 or 2373 or 2574H—Multivariable Calculus (4 cr)
ME 3324—Introduction to Thermal Science (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Rhet 3562—Technical Writing (3 cr)
Stat 3021—Introduction to Probability and Statistics (3 cr)

Electives—8 credits of engineering electives, 6 credits of biological science electives, at least 3 credits of technical electives (computer science), or 3 additional credits of engineering or science electives, plus liberal education requirements.

Sample Biosystems and Agricultural Engineering Program

Freshman Year

Fall Semester (17 cr)
BAE 1011—BAE Orientation (1 cr)
Chem 1021—Chemical Principles I (4 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (15 cr)
Chem 1022—Chemical Principles II (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Liberal education elective (3 cr)

Sophomore Year

Fall Semester (15 cr)
AEM 2021—Statics and Dynamics (4 cr)
BAE 2113—Introduction to Design (3 cr)
Biol 1009—General Biology (4 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)

Spring Semester (17 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
BAE 3013—Engineering Principles of Molecular and Cellular Processes (3 cr)
CE 3502—Fluid Mechanics (4 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Liberal education elective (3 cr)

Junior Year

Fall Semester (16 cr)
BAE 3023—Engineering Principles of Soil-Water-Plant Systems (3 cr)
ME 3324—Introduction to Thermal Science (4 cr)
Stat 3021—Introduction to Probability and Statistics (3 cr)
Technical elective (3 cr)
Biology elective (3 cr)

Spring Semester (16 cr)
BAE 4023—Instrumentation and Control for Biological Systems (3 cr)
BAE emphasis (BAE 4313*/4323*, 4523*/4533, or 4713*/4723*) (3 cr)
EE 3005—Fundamentals of Electrical Engineering (4 cr)
Rhet 3562—Technical and Professional Writing (3 cr)
Engineering elective or BAE emphasis (3 cr)

Senior Year

Fall Semester (18 cr)
BAE 4013—Transport in Biological Systems (4 cr)
BAE 4112—Senior Design I (2 cr)
BAE emphasis or engineering elective (BAE 5513) (3 cr)
Engineering elective (3 cr)
Liberal education elective (3 cr)
Biology elective (3 cr)
Spring Semester (14 cr)
BAE 4122—Senior Design II (2 cr)
BAE emphasis (BAE 4313*/4323*, 4533/4523*, or 4713*/4723*) (3 cr)
Engineering elective or BAE emphasis (3 cr)
Liberal education elective (3 cr)
Liberal education elective (3 cr)
** Offered alternating years*

Chemical Engineering

Department of Chemical Engineering and Materials Science

B.Ch.E.

The mission of the Department of Chemical Engineering and Materials Science is to perform the nation's highest quality education and research, at the undergraduate and graduate levels, in the behavior and structure of chemical processes and materials.

The educational objective of the chemical engineering program is to provide experiences that challenge students to:

- learn the scientific and engineering principles underlying the six major elements of chemical engineering: balances of material and energy; thermodynamics of physical and chemical equilibria; transport of heat, mass, and momentum; reaction kinetics and reactor analysis; separation operations; and process dynamics and control.
- apply and integrate knowledge of the elements of chemical engineering to identify, formulate, and solve chemical process design problems.
- learn to use and apply modern experimental and computational techniques in chemical engineering.
- conduct experiments, including design of experiment, execution and recording, analysis and interpretation of results, and professional reporting of results.
- prepare for a career in chemical engineering and related fields by developing communication skills and coming to understand the importance of lifelong learning, professionalism, and ethical responsibility.

The chemical engineer is primarily a producer whose special province is to develop a process from its laboratory beginning through semiworks equipment to full-scale production. Chemical engineering is based on applications of chemistry, biology, physics, materials science, mathematics, and economics. The chemical engineering curriculum (third and fourth years) includes the study of applied mathematics; material and energy balances; properties and physics of gases, liquids, and solids; fluid mechanics; heat and mass transfer; thermodynamics; chemical and biological reaction kinetics and reactor design; and the integrating subjects of process design, control, and economic optimization. Because of this broad-based foundation, which emphasizes basic and engineering science, the chemical engineer is considered the universal engineer.

Chemical engineering deals with operations such as materials handling, mixing, fluid flow and metering, extrusion, coating, heat exchange, filtration, drying, evaporation, distillation, absorption, extraction, ion exchange, combustion, catalysis, and processing in chemical and biochemical reactors.

Because many industries are based on some chemical or physical transformation of matter, the chemical engineer is much in demand. He or she may work in the manufacture of inorganic products (fertilizers, paints, ceramics, electronic materials); in the manufacture of organic products (polymers, films, papers, petrochemicals); in the manufacture of batteries and fuel cells; in the processing of minerals and materials; in food processing and fermentation, or in the production of antibiotics and biochemical products.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.70).

Degree Requirements

Students must complete at least 129 credits to graduate, including at least 30 credits in the major. The credit total includes the lower division program of chemistry, mathematics, physics, biology, and liberal education, as well as the upper division program of chemical engineering, chemistry, materials science, electives, and liberal education requirements.

The student, together with his or her adviser, plans the degree program in stages. A course plan is submitted every semester for the first two years, and once a year after that.

Required Courses

Chem 1021—Chemical Principles I
Chem 1022—Chemical Principles II
Chem 2301—Organic Chemistry I
Chem 2302—Organic Chemistry II
Chem 2311—Organic Lab
Chem 3501—Physical Chemistry I
Chem 3502—Physical Chemistry II
Chem 4121—Process Analytical Chemistry
ChEn 4001—Material and Energy Balances
ChEn 4002—Transport Phenomena
ChEn 4003—Heat and Mass Transfer
ChEn 4004—Separation Processes
ChEn 4101—Chemical Engineering Thermodynamics
ChEn 4102—Reaction Kinetics and Reactor Engineering
ChEn 4401—Chemical Engineering Laboratory I
ChEn 4402—Chemical Engineering Laboratory II
ChEn 4501—Chemical Engineering Process Design I
ChEn 4502—Chemical Engineering Process Design II
ChEn 4601—Process Control
CSci 1107—Introduction to Programming for Scientists and Engineers
Math 1271 or 1371 or 1571H—Calculus I
Math 1272 or 1372 or 1572H—Calculus II
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations
Math 2263 or 2374 or 2574H—Multivariable Calculus
MatS 3011—Introduction to Materials Science and Engineering
Phys 1301—Introductory Physics I
Phys 1302—Introductory Physics II

Electives

Elective emphasis courses chosen with adviser assistance from chemical engineering and related areas such as biochemical engineering, biotechnology, biomedical engineering, chemistry, computer science and engineering, food science, foreign language and culture, industrial engineering, interfacial engineering, management and economics, materials science, mathematics, paper science and engineering, polymer science, and process engineering.

Sample Chemical Engineering Program

Freshman Year

Fall Semester (15-17 cr)
Chem 1021—General Principles of Chemistry I with Lab (4 cr)
ChEn/Mats 1001—Advances in Chemical Engineering (1 cr) optional
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371—IT Calculus I (4 cr)
Liberal education elective (3-4 cr)

Spring Semester (16 cr)
Chem 1022—General Principles of Chemistry II with Lab (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Liberal education elective (4 cr)

Sophomore Year

Fall Semester (17 cr)
Chem 2301—Organic Chemistry I (3 cr)
CSci 1107—Introduction to Programming for Scientists and Engineers (3 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Liberal education elective (3 cr)
Spring Semester (17 cr)
Chem 2302—Organic Chemistry II (3 cr)
Chem 3501—Physical Chemistry I (3 cr)
ChEn 4001—Material and Energy Balances (4 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
MatS 3011—Introduction to the Science of Materials (3 cr)

Junior Year

Fall Semester (17 cr)
Chem 2311—Organic Chemistry Lab I (3 cr)
Chem 3502—Physical Chemistry II (3 cr)
ChEn 4101—Chemical Engineering Thermodynamics (4 cr)
ChEn 4002—Transport Phenomena (4 cr)
Liberal education elective (3 cr)
Spring Semester (17 cr)
Chem 4121—Process Analytical Chemistry (3 cr)
ChEn 4102—Reaction Kinetics and Reactor Engineering (4 cr)
ChEn 4003—Heat and Mass Transfer (4 cr)
Technical elective (Emphasis I) (3 cr)
Liberal education elective (3 cr)

Senior Year

Fall Semester (16 cr)
ChEn 4004—Separation Processes (4 cr)
ChEn 4401—Chemical Engineering Lab I (3 cr)
ChEn 4501—Chemical Engineering Process Design I (3 cr)
Technical elective (Emphasis II) (3 cr)
Liberal education elective (3 cr)
Spring Semester (13 cr)
ChEn 4402—Chemical Engineering Lab II (2 cr)
ChEn 4502—Chemical Engineering Process Design II (2 cr)
ChEn 4601—Process Control (3 cr)
Technical elective (Emphasis III) (3 cr)
Technical elective (Emphasis IV) (3 cr)

Chemistry

Department of Chemistry

B.S.Chem.

Mission—To enrich the science of chemistry through the education of students from all disciplines, the training of future professional chemists, and the pursuit of knowledge.

Chemistry probes the fundamental concepts of nature and helps us understand the world around us. It deals with all substances at the molecular level: their composition, their properties, and how they are transformed into new substances.

Chemistry is a central science of great importance to society. It provides a broad range of opportunities in many specialized fields, including biotechnology, polymer chemistry, environmental chemistry, materials chemistry, and medicine.

After graduating with a bachelor's degree, many chemistry majors go on to graduate or professional schools to pursue advanced degrees. Other graduates find employment in industry, education, or government.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00)

Degree Requirements

Students must complete at least 120 credits to graduate, including 40 credits in the major. The chemistry curriculum includes courses in chemistry, physics, mathematics, and the liberal arts distributed as follows:

Chemistry lect/lab (31 cr)
Mathematics (12 cr)
Calculus-based physics (8 cr)
Advanced chemistry lecture elective (3 cr)
Advanced chemistry lab electives (6 cr)
Advanced technical electives (6 cr)
Math or physics elective (4 cr)
Liberal education electives (15 cr)
Free electives (27 cr)

All required courses must be taken A-F. A grade of C- or better is required in all technical courses.

By selecting appropriate electives, students can construct a program with emphasis in special interest areas such as bioscience, chemical physics, education, environmental chemistry, and materials chemistry. Other special interest areas are also possible, and chemistry advisers can be helpful in designing such programs. Students can do dual degrees, but this option requires careful course planning and should be discussed as early as possible with an adviser.

All chemistry majors are advised by faculty and staff in the chemistry advising office. After consulting with an adviser, students submit a one-year plan in their degree program.

Required Courses

Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2101—Analytical Chemistry (3 cr)
Chem 2111—Analytical Chemistry Lab (2 cr)
Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Chemistry Lab (3 cr)
Chem 3501—Physical Chemistry I (3 cr)
Chem 3502—Physical Chemistry II (3 cr)
Chem 4701—Inorganic Chemistry Lect (3 cr)
Advanced chemistry lecture elective (3 cr)
Advanced chemistry lab elective (6 cr)
Three courses selected from: Chem 4094—Directed Studies, 4111, 4311, 4511, 4711, 5223
Advanced technical electives—Two 3xxx or higher courses of 3 credits or more in any field of science (6 cr)
Math 1271 or 1371 or 1571H—Calculus I (4 cr)
Math 1272 or 1372 or 1572H—Calculus II (4 cr)
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations
or Phys 2303—Physics III (4 cr)
Math 2263 or 2374 or 2574H—Mulivariable Calculus (4 cr)
Phys 1301—Physics I (4 cr)
Phys 1302—Physics II (4 cr)

Chemistry Minor

A minor is available through the College of Liberal Arts (CLA); see the chemistry program in the CLA Degree Program and Minors section.

The chemical engineering program was ranked #1 in the nation in a National Research Council report.

Sample Chemistry Program

Freshman Year

Fall Semester (15 cr)
Chem 1021—Chemical Principles I (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371—IT Calculus I (4 cr)
Liberal education elective (3 cr)
Spring Semester (16 cr)
Biol 1009—Biology (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1301—Physics I (4 cr)

Sophomore Year

Fall Semester (16 cr)
Chem 2101—Analytical Chemistry (3 cr)
Chem 2111—Analytical Chemistry Lab (2 cr)
Chem 2301—Organic Chemistry I (3 cr)
Math 2374—IT Mulivariable Calculus and Vector Analysis (4 cr)
Phys 1302—Physics II (4 cr)
Spring Semester (16 cr)
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Chemistry Lab (3 cr)
Math 2373—IT Linear Algebra and Differential Equations
or Phys 2303—Physics III (4 cr)
Liberal education electives (6 cr)

Junior Year

Fall Semester (14 cr)
Chem 3501—Physical Chemistry I (3 cr)
Advanced lab elective (2 cr)
Advanced technical elective (3 cr)
Liberal education elective (3 cr)
Free elective (3 cr)

Spring Semester (15 cr)
Chem 3502—Physical Chemistry II (3 cr)
Advanced technical elective (3 cr)
Liberal education elective (3 cr)
Free electives (6 cr)

Senior Year

Fall Semester (14 cr)
Chem 4701—Inorganic Chemistry Lecture (3 cr)
Advanced chemistry lecture elective (3 cr)
Advanced lab elective (2 cr)
Free electives (6 cr)
Spring Semester (14 cr)
Advanced lab elective (2 cr)
Free electives (12 cr)

Civil Engineering

Department of Civil Engineering

B.C.E.

The mission of the civil engineering program is comprised of three overlapping and mutually supportive components:

1. Prepare students to become productive engineers and contributing members of their professional community.
2. Prepare students for continual learning and professional development.
3. Prepare students for formal advanced education.

The program has four core objectives:

- To produce graduates with a strong fundamental scientific and technical knowledge base and critical thinking skills required for engineering problem formulation and problem solving.
- To produce graduates with the ability to work as a professional team member. This includes the ability to communicate effectively through both oral and written language.
- To produce graduates with an understanding of their obligations as professional civil engineers to protect human health, welfare, and the environment.
- To ensure that graduates have opportunities to complement their academic studies with scholarly (research) investigations, co-ops, and internships.

Civil engineering deals with the science and art of engineering applied to solving problems and designing systems related to infrastructure and the environment. Principal fields within civil engineering are structural engineering, environmental engineering, water resources engineering, transportation engineering, and geotechnical engineering. The upper division civil engineering program requires students to take introductory courses in all of the above areas. In addition, students may emphasize a special interest in one of the areas by selecting appropriate technical electives in consultation with their adviser.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

Students must complete at least 128 credits to graduate, including 57 credits in the major. In addition to the liberal education requirements for all Twin Cities campus students, the lower division program requires coursework in basic and engineering science, math, physics, chemistry, geology, statistics, computer science, statics, and deformable body mechanics.

The upper division program requires courses in surveying, transportation, soil mechanics, fluid mechanics, water resources, environmental sciences, structures, project management, engineering economics, and engineering design. Students are also required to select appropriate technical elective courses.

Required Courses

CE 3101—Computer Applications (3 cr)*
CE 3201—Transportation Engineering (3 cr)
CE 3202—Surveying and Mapping (2 cr)
CE 3301—Soil Mechanics I (3 cr)
CE 3401—Linear Structural Analysis (3 cr)
CE 3402—Construction Materials (3 cr)
CE 3501—Environmental Engineering (3 cr)
CE 3502—Fluid Mechanics (4 cr)
CE 4101—Project Management (3 cr)
CE 4102—Capstone Design (3 cr)
CE 4301—Soil Mechanics II (3 cr)
CE 4401—Steel and Concrete Design I (4 cr)
CE 4501—Hydrologic Design (4 cr)
CE 4502—Water and Wastewater Treatment (3 cr)
Technical electives (13 cr)**

A total of 71 credits are required from other departments, distributed as follows:
AEM 2011—Statics (3 cr)
AEM 2012—Dynamics (3 cr)*
AEM 3031—Deformable Body Mechanics (3 cr)
Chem 1021, 1022 (8 cr)
Geo 1001 (4 cr)
Math 1371, 1372, 2373, 2374
or Math 1271, 1272, 2243, 2263
or Math 1571H, 1572H, 2573H, 2574H (16 cr)
Phys 1301, 1302 (8 cr)
Stat 3021—Applied Statistics (3 cr)
Biology with lab (4 cr)
Freshman writing requirement (EngC 1011 or Rhet 1152 recommended)
Liberal education electives (15 cr)

***Substitutions**—Upon recommendation of an adviser, students may make the following substitutions:*
A CSci programming course for CE 3101
A CE environmental course for AEM 2012

*****Electives**—Students may obtain guidelines for meeting the technical elective requirement in 122 Civil Engineering.*

Final Project

All civil engineering students must complete CE 4102—Capstone Design.

Sample Civil Engineering Program

Freshman Year

Fall Semester (16 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Biology with lab (4 cr)
Freshman writing requirement (EngC 1011 or Rhet 1152 recommended) (4 cr)

Spring Semester (17 cr)
CE 1101—Civil Engineering Orientation (1 cr)
Chem 1021—Introduction to Chemistry (4 cr)
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)

Sophomore Year

Fall Semester (16 cr)
AEM 2011—Statics (3 cr)
CE 3202—Surveying (2 cr)
Chem 1022—Introduction to Chemistry II (4 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Stat 3021—Probability and Statistics (3 cr)

Spring Semester (16 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
CE 3101—Computer Applications in Civil Engineering I (3 cr)
CE 3201—Transportation Engineering (3 cr)
CE 3501—Environmental Engineering (3 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)

Junior Year

Fall Semester (16-17 cr)
AEM 2012—Dynamics (3 cr)
CE 3401—Linear Structural Analysis (3 cr)
CE 3402—Construction Materials (3 cr)
CE 3502—Fluid Mechanics (4 cr)
Liberal education elective (3-4 cr)

Spring Semester (17-18 cr)
CE 3301—Soil Mechanics I (3 cr)
CE 4401—Steel and Concrete Reinforced Design (4 cr)
CE 4501—Hydrologic Design (4 cr)
CE 4502—Water and Wastewater Treatment (3 cr)
Liberal education elective (3-4 cr)

Senior Year

Fall Semester (15-18 cr)
CE 4101W—Project Management (3 cr)
CE 4301—Soil Mechanics II (3 cr)
CE technical electives (6-8 cr)
Liberal education elective (3-4 cr)

Spring Semester (15-19 cr)
CE 4102W—Capstone Design (3 cr)
CE technical electives (6-8 cr)
Liberal education electives (6-8 cr)

Computer Engineering

Department of Electrical and Computer Engineering

B.Comp.Eng.

The mission of the computer engineering program is to educate students in the core topics as well as in a broad set of specialties of computer engineering, to impart students with professional attributes that characterize a well-schooled engineer and citizen, and to provide students with opportunities for research experience in one of the leading computer engineering centers of scholarship.

The field of computer engineering resulted from the tremendous development of computers and, in particular, the evolution of microprocessors. The design process for almost every electronic system includes the specification and development of the control program for the system's microprocessor. A particular computer engineering job can be more closely related to hardware or software, to functional design or detailed design. The B.Comp.Eng. degree provides the background necessary for persons, with continuing study, to work in any of the many computer engineering subfields. The bachelor degree itself does not, however, provide highly specialized knowledge in any particular subfield.

The program in computer engineering is built on a foundation of mathematics and sciences. It educates students in the core topics as well as in a broad set of specialties. It imparts the professional attributes that characterize a well-schooled engineer and citizen. It aims to provide its graduates with:

- knowledge of fundamentals. Students are educated in the mathematical, physical, and computer sciences which underpin modern computer engineering.
- experimental skills and technological awareness. The curriculum instills the skills and mindsets necessary to acquire, analyze, and interpret data and to remain aware of relevant current and future technologies.
- social and professional attributes. Students are introduced to the liberal arts and engineering ethics. Opportunities are provided to acquire communication skills and to experience the application of engineering design skills in the team mode. The necessity of lifelong learning to a successful engineering career is emphasized.

- creative thinking and problem-solving skills. Students are familiarized with the essential tools of modern computer engineering and are imbued with the attitude necessary for their efficient application.
- technical breadth and depth. Students are educated in the broad spectrum of computer engineering subdisciplines and are given the opportunity for in-depth study in several specialties.

The computer engineering curriculum, offered jointly by the Department of Electrical and Computer Engineering (ECE) and the Department of Computer Science and Engineering (CSE), gives graduates a strong theoretical and practical background. It requires students to learn to work in teams and to develop good oral and written communication skills. It offers students an opportunity to concentrate in one of several areas, such as computer design, computer architecture and networks, and very-large integrated circuit design and computer-aided circuit design. Elective courses may be selected from ECE, CSE, or other departments to tailor a program to fit particular interests.

An honors program and an engineering co-op program are available to qualified upper division students. The honors program offers students an opportunity to do a two-semester individual project under the guidance of a faculty member. The co-op program offers industrial experience and some financial support through alternate on-campus study and off-campus industrial assignment.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT.

Degree Requirements

Students must complete at least 126 credits to graduate, including 78 credits in the major. The curriculum includes 16 credits of calculus from mathematics; 8 credits of calculus-based physics; 32 credits of required electrical engineering courses; 20 credits of required computer science courses; 20 credits of senior-level technical electives from computer science or electrical engineering; 7 credits of approved electives; and liberal education requirements. Honors students may substitute their senior design project credits for senior technical electives and the general senior project design course. Co-op students who complete both industrial assignments may use their 3 industrial assignment credits as non-major senior technical electives.

Transfer students must satisfy IT's residency requirements, and all senior technical electives must be taken from the University. All technical courses must be taken A-F. The average of all grades must be C- or better, and the average grade in all electrical engineering and computer science courses must be C or better.

Required Courses

CSci 1901—Structure of Computer Programming I
CSci 1902—Structure of Computer Programming II
CSci 2011—Discrete Structures of Computer Science
CSci 4041—Algorithms and Data Structures
CSci 4061—Introduction to Operating Systems
EE 2001—Introduction to Electronic and Electrical Circuits
EE 2002—Introductory Circuits and Electronics Laboratory
EE 2011—Linear Systems and Circuits
EE 2301—Introduction to Digital System Design
EE 2361—Introduction to Microcontrollers
EE 3015—Signals and Systems
EE 3025—Statistical Methods in Electrical and Computer Engineering
EE 3101—Circuits and Electronics Laboratory I
EE 3102—Circuits and Electronics Laboratory II
EE 3115—Analog and Digital Electronics
EE 3601—Transmission Lines
EE 4951W—Senior Design Project
or EE 4981H/4982V—Seniors Honors Project
Math 1371 or 1271 or 1571H—Calculus I
Math 1372 or 1272 or 1572H—Calculus II
Math 2373 or 2243 or 2573H—Linear Algebra and Differential Equations
Math 2374or 2263 or 2574H—Multivariable Calculus
Phys 1301W—Introductory Physics for Science and Engineering I
Phys 1302W—Introductory Physics for Science and Engineering II
Two of EE 4301, 4341, 5361/CSci 5201
20 credits of EE and CSci senior technical electives

Final Project

Students must take 7 credits of approved electives.

All students must take EE 4951W—Senior Design Project (2 cr) or the two-semester honors version 4981H/4982V. Students are organized into teams of approximately five members and design and construct a project under the direction of a faculty member.

Sample Computer Engineering Program

Freshman Year

Fall Semester (15 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301W—Introductory Physics for Science and Engineering I (4 cr)
Liberal education elective (3 cr)
Spring Semester (16-17 cr)
CSci 1901—Structure of Computer Programming I (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302W—Introductory Physics for Science and Engineering II (4 cr)
Biology with lab (4 cr)
EE 1001—Introduction to Electrical Engineering (1 cr) (optional)

Sophomore Year

Fall Semester (16 cr)
CSci 1902—Structure of Computer Programming II (4 cr)
EE 2001—Introduction to Electronic and Electrical Circuits (3 cr)
EE 2002—Introductory Circuits and Electronics Lab (1 cr)
EE 2301—Introduction to Digital System Design (4 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)

Spring Semester (18 cr)
CSci 2011—Discrete Structures of Computer Science (4 cr)
EE 2011—Linear Systems and Circuits (3 cr)
EE 2361—Introduction to Microcontrollers (4 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Liberal education elective (3 cr)

Junior Year

Fall Semester (16 cr)
EE 3015—Signals and Systems (3 cr)
EE 3101—Circuits and Electronics Lab I (2 cr)
EE 3115—Analog and Digital Electronics (4 cr)
Technical elective (3 cr)
Liberal education elective (4 cr)
Spring Semester (16 cr)
CSci 4041—Algorithms and Data Structures (4 cr)
EE 3025—Statistical Methods (3 cr)
EE 3102—Circuits and Electronics Lab II (2 cr)
EE 3601—Transmission Lines (3 cr)
Liberal education elective (4 cr)

Senior Year

Fall Semester (16 cr)
CSci 4061—Introduction to Operating Systems (4 cr)
Senior technical electives (12 cr)
Spring Semester (15 cr)
EE 4951W—Senior Design Project (2 cr)
Senior technical electives (10 cr)
Liberal education elective (3 cr)

Computer Science

Department of Computer Science

B.S.Comp.Sc.

Computer science is concerned with the study of the hardware, software, and theoretical aspects of high-speed computing devices and with the application of these devices to scientific, technological, and business problems.

A bachelor's degree gives students a basic understanding of computer science. After completing a required set of fundamental courses, students arrange their subsequent work around one of several upper division emphases within either computer science or an interdisciplinary area involving computer applications. The degree prepares students for graduate work or for various industrial, governmental, and business positions involving the use of computers.

Admission Requirements—Complete Math 1271 (1371) and 1272 (1372), Math 2243, CSci 1901, 1902, 2011, and meet GPA requirement set by IT (currently 2.70).

Degree Requirements

Students must complete at least 124 credits to graduate, including at least 45 credits in the major. The bachelor of science degree requires, in addition to University requirements, four mathematics courses, two physics courses, and one statistics course. The degree also requires 36 credits of required CSci classes, plus an upper division emphasis. The upper division emphasis is any program that

- forms a coherent academic program in an area of computer science or its applications;
- consists of at least 17 credits of 4xxx (or higher) courses with at least nine of these being CSci courses;
- consists primarily of regular classes; in particular, the upper division option should contain no more than 3 credits of classes numbered CSci 59xx or CSci 4970, or any non-CSci independent study classes.

All courses listed here must be taken A-F and passed with a C- or better.

Required Courses

CSci 1901—Structure of Computer Programming I
CSci 1902—Structure of Computer Programming II
CSci 2011—Discrete Structures of Computer Science
CSci 2021—Machine Architecture and Organization
CSci 2031—Introduction to Numerical Computing
CSci 4011—Formal Languages and Automata Theory
CSci 4041—Algorithms and Data Structures
CSci 4061—Introduction to Operating Systems
CSci 4081—Introduction to Software Engineering
Math 1271 or 1371 or 1571H—Calculus I
Math 1272 or 1372 or 1572H—Calculus II
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations
One additional 3 or 4 credit course with advanced math or logic content
Phys 1301—Introductory Physics I
Phys 1302—Introductory Physics II
Stat 3021—Introduction to Probability and Statistics

Computer Science Minor

A minor is available through the College of Liberal Arts (CLA); see the computer science program in the CLA Degree Programs and Minors section.

Sample Computer Science Program

Freshman Year

Fall Semester (15 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Liberal education elective (3 cr)
and EngC 1011—University Writing and Critical Reading (4 cr)
Spring Semester (16 cr)
CSci 1901—Structure of Computer Programming I (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Liberal education elective (4 cr)

Sophomore Year

Fall Semester (15 cr)
CSci 1902—Structure of Computer Programming II (4 cr)
CSci 2011—Discrete Structures (4 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Stat 3021—Introduction to Probability and Statistics (3 cr)
Spring Semester (14-16 cr)
CSci 2021—Machine Architecture and Organization (4 cr)
CSci 2031—Introduction to Numerical Computing (4 cr)
Other math elective (3-4 cr)
Liberal education elective (3-4 cr)

Junior Year

Fall Semester (14-19 cr)
CSci 4041—Algorithms and Data Structures (4 cr)
CSci 4061—Introduction to Operating Systems (4 cr)
Liberal education elective (3-4 cr)
Elective (3-4 cr)
Elective (3 cr) (if needed)
Spring Semester (14-16 cr)
CSci 4011—Formal Languages and Automata Theory (4 cr)
CSci 4081W—Introduction to Software Engineering (4 cr)
Liberal education elective (3-4 cr)
Elective (3-4 cr)

Senior Year

Fall Semester (15-18 cr)
Upper division CSci (3 cr)
Upper division CSci (3 cr)
Upper division (3-4 cr)
Elective (3-4 cr)
Liberal education elective (3-4 cr)
or Elective (3-4 cr)

Spring Semester (15-19 cr)
Upper division CSci (3 cr)
Upper division (3-4 cr)
Upper division or elective (3-4 cr)
Elective (3-4 cr)
Liberal education elective (3-4 cr)
or Elective (3-4 cr)

Electrical Engineering

Department of Electrical and Computer Engineering

B.E.E.

The mission of the electrical engineering program is to educate students in the core topics as well as in a broad set of specialties of electrical engineering, to impart students with professional attributes that characterize a well-schooled engineer and citizen, and to provide students with opportunities for research experience in one of the leading electrical engineering centers of scholarship.

Electrical engineers work in highly diverse areas such as computers, telecommunications, semiconductors, electric energy, consumer and entertainment electronics, biomedical technology, defense and aerospace systems, and automotive electronics. They design and develop components, software, and systems; carry out analysis; and work in research, management, and sales. The bachelor of electrical engineering prepares students for immediate entry into professional work, for graduate study and further specialization in engineering, for advanced work in business and management, or for study in a different direction such as medicine.

The program in electrical engineering is built on a foundation of mathematics and sciences. It educates students in the core topics as well as in a broad set of specialties. It imparts the professional attributes that characterize a well-schooled engineer and citizen. It aims to provide its graduates with:

- knowledge of fundamentals. Students are educated in the mathematical, physical, and computer sciences which underpin modern computer engineering.
- experimental skills and technological awareness. The curriculum instills the skills and mindsets necessary to acquire, analyze, and interpret data and to remain aware of relevant current and future technologies.
- social and professional attributes. Students are introduced to the liberal arts and engineering ethics. Opportunities are provided to acquire communication skills and to experience the application of engineering design skills in the team mode. The necessity of lifelong learning to a successful engineering career is emphasized.
- creative thinking and problem-solving skills. Students are familiarized with the essential tools of modern computer engineering and are imbued with the attitude necessary for their efficient application.
- technical breadth and depth. Students are educated in the broad spectrum of computer engineering subdisciplines and are given the opportunity for in-depth study in several specialties.

The curriculum administered by the Department of Electrical and Computer Engineering gives graduates a strong theoretical and practical background based on design experiences. It requires students to work in teams and develop good oral and written communication skills. It offers an opportunity to concentrate in one of several specialized areas, including biomedical engineering, communications, computers, control systems, electric energy systems and power electronics, microelectronic devices and circuit design, optics and magnetic recording, and signal processing.

An honors program and an engineering co-op program are available to qualified upper division students. The honors program offers an opportunity to do a two-semester individual project under the guidance of a faculty member. The co-op program offers industrial experience and some financial support through alternate on-campus study and off-campus industrial assignment.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT.

Degree Requirements

Students must complete at least 126 credits to graduate, including 65 credits in the major. The requirement includes 16 credits of calculus from mathematics; 8 credits of calculus-based physics; 4 credits of chemistry; 4 additional credits from chemistry or physics; 4 credits of computer science; 35 credits of required electrical engineering courses; 20 credits of senior-level technical electives from electrical engineering; 12 credits approved electives; and liberal education courses. Honors students may substitute their senior design project credits for senior technical electives and the general senior project design course. Co-op students may use their 3 industrial assignment credits as non-major technical electives if they complete both industrial assignments.

Transfer students must satisfy IT's residency requirements, and all senior technical electives must be taken from the University. All technical courses must be taken A-F. Students must complete all required technical courses with a grade of C- or better and the average grades in all electrical engineering courses must be C or better.

Required Courses

Chem 1021—Chemical Principles I
Chem 1022—Chemical Principles II
or Phys 2303—Introductory Physics for Sciences and Engineering III
CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers
EE 2001—Introduction to Electronic and Electrical Circuits
EE 2002—Introduction to Circuits and Electronics Laboratory
EE 2011—Linear Systems and Circuits
EE 2301 and 0301—Introduction to Digital System Design
EE 2361 and 0361—Introduction to Microcontrollers
EE 3015—Signals and Systems
EE 3025—Statistical Methods in Electrical and Computer Engineering
EE 3101—Circuits and Electronics Laboratory I
EE 3102—Circuits and Electronics Laboratory II
EE 3115—Analog and Digital Electronics
EE 3161—Semiconductor Devices
EE 3601—Transmission Lines
EE 4951W—Senior Design Project
Math 1271 or 1371 or 1571H—Calculus I
Math 1272 or 1372 or 1572H—Calculus II
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations
Math 2263 or 2374 or 2574H—Multivariable Calculus
Phys 1301W—Introductory Physics for Sciences and Engineering I
Phys 1302W—Introductory Physics for Sciences and Engineering II

Electives

20 credits of EE senior (4xxx or 5xxx) technical electives and 12 credits of electives from an approved list of courses

Final Project

All students must take EE 4951W—Senior Design Project (2 cr). Students are organized into teams of approximately five members and design and construct a project under the direction of a faculty member.

Sample Electical Engineering Program (with second semester of chemistry)

Freshman Year

Fall Semester (16-17 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301W—Introductory Physics I (4 cr)
Biology with lab (4 cr)
EE 1001—Introduction to Electrical Engineering (1 cr) (optional)

Spring Semester (12 cr)
CSci 1113—Introduction to C/C++ Programming (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302W—Introductory Physics II (4 cr)

Sophomore Year

Fall Semester (16 cr)
Chem 1021—Chemical Principles I (4 cr)
EE 2001—Introduction to Electronic and Electrical Circuits (3 cr)
EE 2002—Introduction to Circuits and Electronics Lab (1 cr)
EE 2301 and 0301—Introduction to Digital System Design (4 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)

Spring Semester (18 cr)
Chem 1022—Chemical Principles II (4 cr)
or Phys 2303—Physics of Matter (4 cr)
EE 2361 and 361—Introduction to Microcontrollers (4 cr)
EE 2011—Linear Systems and Circuits (3 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Liberal education elective (3 cr)

Junior Year

Fall Semester (16 cr)
EE 3015—Signals and Systems (3 cr)
EE 3101—Circuits and Electronics Lab I (2 cr)
EE 3115—Analog and Digital Electronics (4 cr)
Technical elective (4 cr)
Liberal education elective (3 cr)

Spring Semester (14 cr)
EE 3025—Statistical Methods (3 cr)
EE 3102—Circuits and Electronics Lab II (2 cr)
EE 3161—Semiconductor Devices (3 cr)
EE 3601—Transmission Lines (3 cr)
Liberal education elective (3 cr)

Senior Year

Fall Semester (16 cr)
Senior technical electives (16 cr)

Spring Semester (15 cr)
EE 4951—Senior Design Project (2 cr)
Senior technical electives (10 cr)
Liberal education elective (3 cr)

Geological Engineering

Department of Civil Engineering

B.Geo.E.

The mission of the geological engineering program is comprised of three overlapping and mutually supportive components:

1. Prepare students to become productive engineers and contributing members of their professional community.
2. Prepare students for continual learning and professional development.
3. Prepare students for formal advanced education.

The program has four core objectives:

A. To produce graduates with a strong fundamental scientific and technical knowledge base and critical thinking skills required for engineering problem formulation and problem solving.

B. To produce graduates with the ability to work as a professional team member. This includes the ability to communicate effectively through both oral and written language.

C. To produce graduates with an understanding of their obligations as professional geological engineers to protect human health, welfare, and the environment.

D. To ensure that graduates have had opportunities to complement their academic studies with scholarly (research) investigations, co-ops, and internships.

A geological engineer applies the principles of engineering and science to the problems of planning, analysis, design, construction, and operation of facilities on and under the surface of the Earth. Geological engineering is based on applications of geology, physics, chemistry, mathematics, and engineering mechanics. A geological engineer requires many of the skills required of a civil engineer, an environmental engineer, and geologist. The geological engineer, however, is uniquely qualified to work at the interfaces of these disciplines.

Within the geological engineering program are two degree paths:

The **geoenvironmental option** focuses on 1) soil and groundwater contamination, modeling, and remediation; 2) solid and hazardous waste characterization, management, and disposal; 3) groundwater resources management and exploitation.

The **geomechanics option** focuses on 1) foundations for buildings, bridges, roads, and dams; 2) analysis and design of surface and subsurface excavations; 3) evaluation of natural geologic hazards.

The most common professional employment for graduates is within the private sector as consulting engineers. Graduates also work at international, national, state, and local agencies involved with environmental protection, energy conservation and generation, and natural-resources conservation and exploitation.

After completing approximately four semesters, students may enter an engineering educational cooperative. Participants alternate study semesters with a six-month work period, for which they earn three credits.

With less than one year of additional study beyond the requirements for the geological engineering degree, students can now obtain a double degree: a B. Geological Engineering and B.S. Geology.

The geological engineering program is accredited by the Engineering Accreditation Commission of ABET.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.30).

Degree Requirements

Students must complete at least 128 credits to graduate, including 40 credits in the major. The first two years of the curriculum are almost identical with the first years of the civil engineering program and are similar to those in other IT engineering programs. Students may transfer to geological engineering from another IT engineering program, another University college or campus, or another academic institution.

By choosing one of the two curricular paths within geological engineering, and by selecting appropriate technical electives (in consultation with their academic adviser), students can emphasize various special interest areas in their upper division curriculum.

With few exceptions, all upper division courses in geological engineering, civil engineering, and geology may be used to fulfill the technical elective requirements. Many courses from other IT departments may be used as technical electives in the geological engineering program. However, each student's final program must satisfy the detailed curricular requirements specified by ABET for a geological engineering degree.

Required Courses

AEM 2011—Statics
AEM 2012—Dynamics (geomechanics option only)
AEM 3031—Deformable Body Mechanics
Chem 1021—Chemical Principles I
Chem 1022—Chemical Principles II
Geo 1001—The Dynamic Earth
Geo 2301—Mineralogy
Geo 2302—Petrology
Geo 4203—Principles of Geophysical Exploration
or Geo 4211—Solid Earth Geophysics I
Geo 3911—Introduction to Field Geology
Geo 4501—Structural Geology
Geo 4602 or 4701 or 4703
Math 1271 or 1371 or 1571H—Calculus I
Math 1272 or 1372 or 1572H—Calculus II
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations
Math 2263 or 2374 or 2574H—Multivariable Calculus
Phys 1301—Introductory Physics I
Phys 1302—Introductory Physics II
Stat 3021—Probability and Statistics

Geoenvironmental Option

CE 3101—Computer Applications
CE 3501—Environmental Engineering
CE 3502—Fluid Mechanics
CE 4501—Hydrologic Design
CE 4531—Environmental Process Engineering
CE 4561—Solid and Hazardous Waste
GeoE 3301—Soil Mechanics I
GeoE 4102—Capstone Design
GeoE 4341—Engineering Geostatistics
GeoE 4351—Groundwater Mechanics
GeoE 4352—Groundwater Modeling
GeoE technical electives (6 cr)

Geomechanics Option

CE 3101—Computer Applications I
CE 3502—Fluid Mechanics
CE 4121—Computer Applications II
CE 4351—Groundwater Mechanics
GeoE 3301—Soil Mechanics I
GeoE 3311—Rock Mechanics I
GeoE 4102—Capstone Design
GeoE 4301—Soil Mechanics II
GeoE 4311—Rock Mechanics II
GeoE 4341—Engineering Geostatistics
GeoE technical electives (7 cr)

Final Project

All students must take GeoE 4102—Capstone Design. This course is an extensive capstone design project and requires written and oral presentations of project results.

Geoenvironmental Option

Sample Program

Freshman Year

Fall Semester (16 cr)
Biol 1009—General Biology (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)

Spring Semester (15 cr)
Geo 1001—Introduction to Geology (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Liberal education elective (3 cr)

Sophomore Year

Fall Semester (17 cr)
AEM 2011—Statics (3 cr)
Chem 1021—Chemical Principles I (4 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Stat 3021—Probability and Statistics (3 cr)
Liberal education elective (3 cr)

Spring Semester (17 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
Chem 1022—Chemical Principles II (4 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Liberal education elective (3 cr)
Liberal education elective (3 cr)

Junior Year

Fall Semester (16 cr)
CE 3101—Computer Applications I (3 cr)
CE 3501—Environmental Engineering (3 cr)
CE 3502—Fluid Mechanics (4 cr)
Geo 2301—Mineralogy (3 cr)
Liberal education elective (3 cr)

Spring Semester (13 cr)
CE 4501—Hydrologic Design (4 cr)
Geo 2302—Petrology (3 cr)
GeoE 3301—Soil Mechanics I (3 cr)
GeoE 4341—Engineering Geostatistics (3 cr)
Summer Session (3 cr)
Geo 3911—Field Geology (3 cr)

Senior Year

Fall Semester (15 cr)
CE 4531—Environmental Process Engineering (3 cr)
Geo 4203—Principles of Geophysical Exploration (3 cr)
Geo 4703—Glacial Geology (3 cr)
GeoE 4351—Groundwater Mechanics (3 cr)
GeoE technical elective (3 cr)
Spring Semester (16 cr)
CE 4561—Solid and Hazardous Waste (4 cr)
Geo 4501—Structural Geology (3 cr)
GeoE 4102—Senior Design (3 cr)
GeoE 4352—Groundwater Modeling (3 cr)
GeoE technical elective (3 cr)

Geomechanics Option

Sample Program

Freshman Year

Fall Semester (16 cr)
Biol 1009—General Biology (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Spring Semester (15 cr)
Geo 1001—Introduction to Geology (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Liberal education elective (3 cr)

Sophomore Year

Fall Semester (17 cr)
AEM 2011—Statics (3 cr)
Chem 1021—Chemical Principles I (4 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Stat 3021—Probability and Statistics (3 cr)
Liberal education elective (3 cr)
Spring Semester (17 cr)
AEM 2012—Dynamics (3 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
Chem 1022—Chemical Principles II (4 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Liberal education elective (3 cr)

Junior Year

Fall Semester (16 cr)
CE 3101—Computer Applications I (3 cr)
CE 3502—Fluid Mechanics (4 cr)
Geo 2301—Mineralogy (3 cr)
GeoE 3301—Soil Mechanics I (3 cr)
Liberal education elective (3 cr)
Spring Semester (15 cr)
CE 4121—Computer Applications II (3 cr)
Geo 2302—Petrology (3 cr)
GeoE 3311—Rock Mechanics I (3 cr)
GeoE 4341—Engineering Geostatistics (3 cr)
Liberal education elective (3 cr)
Summer Session (3 cr)
Geo 3911—Field Geology (3 cr)

Senior Year

Fall Semester (16 cr)
Geo 4203—Principles of Geophysical Exploration (3 cr)
Geo 4703—Glacial Geology (3 cr)
GeoE 4301—Soil Mechanics II (3 cr)
GeoE 4351—Groundwater Mechanics (3 cr)
Technical elective (GeoE) (4 cr)
Spring Semester (13 cr)
Geo 4501—Structural Geology (3 cr)
GeoE 4102—Senior Design (3 cr)
GeoE 4311—Rock Mechanics II (3 cr)
GeoE technical elective (4 cr)

Geology

Department of Geology and Geophysics

B.S.Geol.

Mission—To generate and develop knowledge and understanding of the geology of earth processes, and to share the knowledge and understanding by providing a broad range of educational programs to a diverse community within the university, the state, and society as a whole.

Geology is the study of the composition, structure, and history of the Earth and of the processes that operate on and within it, with emphasis on the crust, oceans, and atmosphere. The department's programs emphasize applications of physics, chemistry, and biology to understanding the Earth.

Geologists and geophysicists are employed in a wide range of fields, including exploration for and development of natural resources (hydrocarbons, minerals, groundwater); environmental science; urban planning; education; and oceanography. Potential employers include the oil, gas, and minerals industries; environmental consultants; federal and private research institutions; universities; schools; and government agencies. An advanced degree is usually required for a career in research or teaching.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

Students must complete at least 120 credits to graduate, including 52 credits in the major. Geology and geophysics are closely related fields, and this is reflected in the similarities between the two degree programs. Both are built around a core of basic Earth-science courses taken mainly in the sophomore and junior years. Both programs provide a strong foundation in mathematics, physics, and chemistry.

Selection of a degree program should be made during the second year, though a later decision is possible. Both degree programs offer a good foundation for students preparing either for graduate work or for professional work with the baccalaureate degree.

Specific tracks within the B.S. Geology degree program are completed by selecting appropriate geology and related science courses in consultation with a faculty adviser. Students must pass all core courses with a grade of C- or better.

Required Courses

Geo 2201—Geodynamics I: The Solid Earth
Geo 2301—Mineralogy
Geo 2302—Petrology
Geo 2303—Geochemical Principles
Geo 3202—Geodynamics II: The Fluid Earth

The U of M is a founding member of the Center for Research Libraries, a cooperative resource with more than five million volumes of primary research materials.

Geo 3401—Geochronology and Earth History
Geo 3911—Introduction to Field Geology
Geo 4501—Structural Geology
Geo 4602—Sedimentology and Stratigraphy
Geo 4631—Earth Systems: Geosphere/Biosphere Interactions

Any two of:
Geo 3870—Modeling Workshop
Geo 3880—Laboratory Workshop
Geo 3890—Field Workshop

Any one of:
Geo 4911—Advanced Field Geology
Geo 4971—Field Hydrogeology
15 credits of elective geology, with no more than 4 credits of 1xxx courses and 3 credits of 2xxx courses

Required Courses From Other Programs

Math 1271, 1272 or Math 1371, 1372 or Math 1571H, 1572H—Calculus I and II
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations
Phys 1301, 1302—Introductory Physics I and II
Chem 1021, 1022—Chemical Principles I and II

Electives

12 credits total of appropriate elective courses in physical and natural sciences, engineering, and mathematics, chosen in consultation with a faculty adviser

Geology or Environmental Science Minor

Minors in geology or environmental science are available through the College of Liberal Arts (CLA); see the geology program in the CLA Degree Programs and Minors section.

Sample Geology Program

Freshman Year

Fall Semester (15 cr)
Chem 1021—Principles of Chemistry I (4 cr)
Math 1371—IT Calculus I (4 cr)
Biology with lab (4 cr)
Liberal education elective (3 cr)

Spring Semester (16 cr)
Chem 1022—Principles of Chemistry II (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1301—Introductory Physics I (4 cr)

Sophomore Year

Fall Semester (14 cr)
Geo 2201—Geodynamics I: The Solid Earth (3 cr)
Geo 2301—Mineralogy (3 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Phys 1302—Introductory Physics II (4 cr)

Spring Semester (12 cr)
Geo 2302—Petrology (3 cr)
Geo 2303—Geochemical Principles (3 cr)
Liberal education elective (3 cr)
Technical elective (3 cr)

Summer Session (4 cr)
Geo 3911—Introduction to Field Geology (4 cr)

Junior Year

Fall Semester (15 cr)
Geo 3202—Geodynamics II: The Fluid Earth (3 cr)
Geo 3401—Geochronology and Earth History (3 cr)
Liberal education elective (3 cr)
Liberal education elective (3 cr)
Technical elective (3 cr)

Spring Semester (13 cr)
Geo 3890—Field Workshop (1 cr)
Geo 4501—Structural Geology (3 cr)
Geo 4602—Sedimentology and Stratigraphy (3 cr)
Liberal education elective (3 cr)
Geology elective (3 cr)

Summer Session (4 cr)
Geo 4911—Advanced Field Geology (4 cr)

Senior Year

Fall Semester (15 cr)
Geo 4631—Earth Systems: Geosphere/Biosphere Interactions (3 cr)
Geology elective (3 cr)
Geology elective (3 cr)
Technical elective (3 cr)
Free elective (3 cr)

Spring Semester (14 cr)
Geo 3890—Field Workshop (1 cr)
Geology elective (3 cr)
Geology elective (3 cr)
Technical elective (3 cr)
Free elective (4 cr)

Geophysics

Department of Geology and Geophysics

B.S.Geophys.

Mission—To generate and develop knowledge and understanding of the geophysics of earth processes, and to share the knowledge and understanding by providing a broad range of educational programs to a diverse community within the university, the state, and society as a whole.

Geophysics is the study of the physical structure and properties of the Earth through application of the principles and techniques of classical physics. Major topics include the physical properties of rocks and minerals, the origin and dynamics of the Earth's gravity and magnetic fields, earthquakes and the propagation of waves in the Earth (seismology), and the dynamics of the Earth's crust, mantle, and deep interior.

Geologists and geophysicists are employed in a wide range of fields, including exploration for and development of natural resources (hydrocarbons, minerals, groundwater); environmental science; urban planning; education; and oceanography. Potential employers include the oil, gas, and minerals industries; environmental consultants; federal and private research institutions; universities; schools; and government agencies. An advanced degree is usually required for a career in research or teaching.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

Students must complete at least 120 credits to graduate, including 52 credits in the major. Geology and geophysics are closely related fields, and this is reflected in the similarities between the two degree programs. Both programs are built around a core of basic Earth science courses taken mainly in the sophomore and junior years. Both programs provide a strong foundation in mathematics, physics, and chemistry.

Selection of a degree program should be made during the second year, though a later decision is possible. Both degree programs offer a good foundation for students preparing either for graduate work or for professional work with the baccalaureate degree.

Students must pass all core courses with a grade of C- or better.

Required Courses

Geo 2201—Geodynamics I: The Solid Earth
Geo 2301—Mineralogy
Geo 2302—Petrology
Geo 2303—Geochemical Principles
Geo 3202—Geodynamics II: The Fluid Earth
Geo 3401—Geochronology and Earth History
Geo 3911—Introduction to Field Geology
Geo 4501—Structural Geology

Any two of:
Geo 3870—Modeling Workshop
Geo 3880—Laboratory Workshop
Geo 3890—Field Workshop

Any one of:
Geo 4911—Advanced Field Geology
Geo 4971—Field Hydrogeology
9 cr of 4xxx elective geophysics courses
9 cr of elective geology courses (no more than 4 cr being 1xxx courses and no more than 3 cr being 2xxx courses)

Required Courses From Other Programs

Chem 1021, 1022—Chemical Principles I and II
Math 1271, 1272 or Math 1371, 1372, or Math 1571H, 1572H—Calculus I and II
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations
Math 2263 or 2374 or 2574H—Multivariable Calculus
Phys 1301, 1302, 2303—Introductory Physics I, II, and III

Electives

Nine credits total of appropriate elective courses in physical and natural sciences, engineering, and mathematics, chosen in consultation with a faculty adviser.

Sample Geophysics Program

Freshman Year

Fall Semester (11 cr)
Chem 1021—Principles of Chemistry I (4 cr)
Math 1371—IT Calculus I (4 cr)
Liberal education elective (3 cr)

Spring Semester (16 cr)
Chem 1022—Principles of Chemistry II (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1301—Introductory Physics I (4 cr)

Sophomore Year

Fall Semester (14 cr)
Geo 2201—Geodynamics I: The Solid Earth (3 cr)
Geo 2301—Mineralogy (3 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Phys 1302—Introductory Physics II (4 cr)

Spring Semester (17 cr)
Geo 2302—Petrology (3 cr)
Geo 2303—Geochemical Principles (3 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Phys 2303—Introductory Physics III (4 cr)
Liberal education elective (3 cr)

Summer Session (4 cr)
Geo 3911—Introduction to Field Geology (4 cr)

Junior Year

Fall Semester (15 cr)
Geo 3202—Geodynamics II: The Fluid Earth (3 cr)
Geo 3401—Geochronology and Earth History (3 cr)
Geophysics elective (3 cr)
Liberal education elective (3 cr)
Technical elective (3 cr)

Spring Semester (14 cr)
Geo 3890—Field Workshop (1 cr)
Geo 4501—Structural Geology (3 cr)
Geophysics elective (3 cr)
Biology with lab (4 cr)
Liberal education elective (3 cr)

Summer Session (4 cr)
Geo 4921—Field Geophysics (4 cr)

Senior Year

Fall Semester (14 cr)
Geophysics elective (3 cr)
Geo elective (3 cr)
Technical elective (3 cr)
Technical elective (3 cr)
Free elective (2 cr)

Spring Semester (13 cr)
Geo 3890—Workshop (1 cr)
Geo elective (3 cr)
Geo elective (3 cr)
Free elective (3 cr)
Liberal education elective (3 cr)

Information Technology

Interdisciplinary

Minor Only

This interdisciplinary minor requires a minimum of 14 credits, including two core courses from the Institute of Technology, and three breadth courses selected from the Colleges of Human Ecology, Liberal Arts, or Architecture and Landscape Architecture. It is intended to provide opportunities to students in nontechnical disciplines to supplement their major with a practical set of courses focused on information technology. Courses furnish basic knowledge and skills in Internet and Web technology and explore application of these skills. A GPA of 2.00 or above is required in the minor courses. Students interested in the minor should contact Ahmed Naumaan in the Department of Computer Science and Engineering, 4-198 Electrical Engineering/Computer Science, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002).

Requirements

Minor Core Courses

Two of the following three courses:
CSci 1103—Introduction to Computer Programming in Java (3 cr)
CSci 1121—Introduction to the Internet 1 (4 cr)
CSci 2121—Introduction to the Internet 2 (4 cr)

Breadth Courses

Three of the following courses:
Comm 3201—Introduction to Electronic Media Production (3 cr)
Comm 3211—Introduction to US Electronic Media (3 cr)
Comm 4231—Comparing Electronic Media Systems (3 cr)
Comm 4235—Electronic Media and Ethnic Minorities, A World View (3 cr)
Comm 4291—New Telecommunication Media (3 cr)
Comm 5233—Electronic Media and National Development (3 cr)
DHA 2334—Computer Applications I: Digital Composition for Design (3 cr)*
DHA 4334—Computer Applications II: Design for the Digital Environment (3 cr)
DHA 4384—Interactive Media (3 cr)
DHA 5381—Digital Illustration (3 cr)
DHA 5382—Digital Sound and Video (3 cr)
DHA 5383—Modeling and Animation (3 cr)
DHA 5385—Internet-based Media (3 cr)
DHA 5399—Theory of Electronic Design (3 cr)
EngC 3632—Electronic Texts (3 cr)
Geog 3561—Principles of Geographic Information Science (3 cr)
Geog 5563—Advanced Geographic Information Science (3 cr)
Geog 5564—Urban Geographic Information Science and Analysis (3 cr)
Jour 3004—Information for Mass Communication (3 cr)
Jour 3614—History of Mass Communication Technology (3 cr)
Jour 3776—Mass Communication Law (3 cr)

**DHA 2334 is a prerequisite for the more advanced courses. The courses are limited to graphic design majors, however technology minors may gain access via instructor permission by showing a degree program form that includes the minor courses.*

Management

Minor Only

This program trains future engineers and scientists in accounting, operations and management sciences, finance, and marketing. Courses are taught by Carlson School of Management (CSOM) faculty. For applications, contact IT Student Affairs, 105 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-624-8504).

To enroll in the management minor, students must have an overall GPA of 2.80 or better and be admitted to an upper division IT major with at least 60 credits completed.

Prerequisites

Econ 1104 *and* 1105
or Econ 1101
and 1102

Required Courses

Acct 2050—Principles of Accounting (4 cr)
Acct 3001—Introduction to Management Accounting (3 cr)
Fina 3001—Finance Fundamentals (3 cr)
Mgmt 3001—Fundamentals of Management (3 cr)
Mktg 3001—Principles of Marketing (3 cr)
Stat 3021—Introduction to Probability and Statistics (or equiv) (3 cr)
4 credits of upper division CSOM electives

Materials Science and Engineering

Department of Chemical Engineering and Materials Science

B.Mat.S.E.

The mission of the Department of Chemical Engineering and Materials Science is to perform the nation's highest quality education and research, at the undergraduate and graduate levels, in the behavior and structure of chemical processes and materials.

The materials science and engineering (MSE) program provides educational experiences that challenge students to:

1. learn the scientific and engineering principles underlying the four major elements of materials engineering: structure, properties, processing, and performance of engineering materials (including metals and alloys, ceramics, polymers, semiconductors, and composites).
2. apply and integrate knowledge of the above four elements to identify, formulate and solve materials selection problems and design problems.
3. learn experimental, statistical and computational techniques in the context of MSE.
4. design and conduct experiments, as well as analyze and interpret data.
5. prepare for an engineering career by developing communication and teamwork skills, and an understanding of the importance of lifelong learning, professionalism, and ethical responsibility.

The four-year program in materials science and engineering leads to a bachelor's degree that enables students to immediately enter the profession. The program develops an understanding of the properties and the origin of these properties in a broad range of materials, including metals, ceramics, semiconductors, polymers, and composites. Because the program is broadly based, graduates find employment across a broad range of industries, including the automotive, chemical, electronics, energy, and medical technology industries. Graduates also find positions in consulting, research, technical management, and teaching.

The materials science and engineering program is accredited by the Engineering Accreditation Commission of ABET.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.30).

Degree Requirements

Students must complete at least 128 credits to graduate, including 38 credits in the major. Credits include the specific required courses listed below. In addition, the University's liberal education requirements must be met.

Required Courses

AEM 2011—Statics (3 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
AEM 4511—Mechanics of Composite Materials (3 cr)
CE 3101—Computer Applications I (3 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2301—Organic Chemistry I (3 cr)
Math 1271 or 1371 or 1571H—Calculus I (4 cr)
Math 1272 or 1372 or 1572H—Calculus II (4 cr)
Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations (4 cr)
Math 2263 or 2374 or 2574H—Multivariable Calculus (4 cr)
MatS 3011—Introduction to Materials Science and Engineering (3 cr)
MatS 3012—Metals and Alloys (3 cr)
Mats 3801—Structural Characterization Lab (2 cr)
Mats 3851W—Materials Properties Lab (2 cr)

MatS 4001—Thermodynamics of Materials (4 cr)
MatS 4002—Mass Transport and Kinetics (4 cr)
MatS 4013—Electrical and Magnetic Properties of Materials (3 cr)
MatS 4212—Ceramics (3 cr)
MatS 4214—Polymers (3 cr)
MatS 4221—Materials Design and Performance (4 cr) (includes lab)
MatS 4301W—Materials Processing (4 cr) (includes lab)
MatS 4400—Senior Design Project (3 cr)
Phys 1301—Introductory Physics I (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Phys 2303—Physics of Matter (4 cr)

Technical Electives

See the director of undergraduate studies for a list of technical electives.

Final Project

The senior design project, MatS 4400, requires a written final report and an oral presentation.

Sample Materials Science and Engineering Program

Freshman Year

Fall Semester (16 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Biology with lab (4 cr)
Spring Semester (16 cr)
Chem 1021—General Principles I with Lab (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Liberal education elective (4 cr)

Sophomore Year

Fall Semester (15 cr)
CE 3101—Computer Applications I (3 cr)
Chem 1022—General Principles II with Lab (4 cr)
Math 2274—Multivariable Calculus and Vector Analysis (4 cr)
Phys 2303—Physics of Matter (4 cr)
Spring Semester (17 cr)
AEM 2011—Statics (3 cr)
Chem 2301—Organic Chemistry I (3 cr)
Math 2273—Linear Algebra and Differential Equations (4 cr)
MatS 3011—Introduction to Materials Science and Engineering (no lab) (3 cr)
Liberal education elective (4 cr)

Junior Year

Fall Semester (16 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
MatS 3012—Metals and Alloys (3 cr)
Mats 3801—Structural Characterization Lab (2 cr)
MatS 4001—Thermodynamics of Materials (4 cr)
Liberal education elective (4 cr)
Spring Semester (15 cr)
MatS 3851W—Materials Properties Lab (2 cr)
MatS 4002—Kinetics and Mass Transport (4 cr)
MatS 4013—Electrical and Magnetic Properties of Materials (3 cr)
Technical elective (3 cr)
Liberal education elective (3 cr)

Senior Year

Fall Semester (17 cr)
MatS 4212—Ceramics (3 cr)
MatS 4214—Polymers (3 cr)
MatS 4221—Materials Design and Performance and Lab (4 cr)
Technical elective (4 cr)
Technical elective (3 cr)
Spring Semester (16 cr)
AEM 4511—Composite Materials (3 cr)
MatS 4301W—Materials Processing (4 cr)
MatS 4400—Senior Design (3 cr)
Technical elective (3 cr)
Liberal education elective (3 cr)

Mathematics

School of Mathematics

The National Research Council ranked the mathematics program #14 in the nation.

B.S.Math.

The School of Mathematics offers a program leading to the bachelor of science degree. The course of study is flexible and may be adapted to satisfy a wide variety of interests and needs. Students may prepare for graduate study in mathematics or emphasize various fields of interest, such as preparation for secondary school teaching, actuarial science, or programs in applied mathematics, including industrial mathematics, mathematics applicable to computer science, and numerical analysis. Programs for specializations in actuarial science, preparation for teaching in the secondary school, and mathematics applicable to computer science earn a designation that appears on the diploma.

Admission Requirements—Complete the lower division courses described below and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

Students must complete at least 120 credits to graduate. This includes one of the lower division sequences described below, eight mathematics adviser-approved upper division courses (including two satisfying the algebra requirement and two satisfying the analysis requirement), and two semesters of technical electives. Students must also complete three semesters of physics and one semester of computer science.

Students must take all required physics and computer science courses A-F and complete them with a grade of C- or better.

For details about what courses are appropriate for the actuarial science, secondary teaching, or computer science specializations, see the publication Mathematics Major Requirements (available in the Undergraduate Math Office, 115 Vincent Hall or on the Web at <www.math.umn.edu>) or consult your adviser. For courses appropriate for other interests, consult your mathematics adviser.

Required Courses

Lower Division Requirements

One of the following sequences:
Math 1271-1272-2243-2263
Math 1371-1372-2373-2374
Math 1571H-1572H-2573H-2574H
Students who have not taken all four semesters of honors calculus must take Math 2283 or Math 3283. Math 3283 satisfies the writing-intensive course in the major requirement.

Upper Division Requirements

Eight upper division math courses and two technical elective courses (which can be mathematics courses)

To satisfy the algebra requirement, students must take two courses from the following:
Math 5705—Enumerative Combinatorics A
or Math 5707 Graph Theory and Non-enumerative Combinatorics B (but not both)
Math 4242—Applied Linear Algebra
Math 5248—Cryptology and Number Theory

Math 5251—Error-Correcting Codes, Finite Fields, Algebraic Curves
Math 5285—Honors: Fundamental Structures of Algebra I
Math 5286—Honors: Fundamental Structures of Algebra II
Math 5385—Introduction to Computational Algebraic Geometry
Math 5711—Linear Programming and Combinatorial Optimization

To satisfy the analysis requirement, students must take two courses from the following:
Math 4606—Advanced Calculus
Math 5486—Introduction to Numerical Methods II
Math 5525—Introduction to Ordinary Differential Equations
Math 5535—Dynamical Systems and Chaos
Math 5583—Complex Variables
Math 5587—Elementary Partial Differential Equations I
Math 5588—Elementary Partial Differential Equations II
Math 5615—Honors: Introduction to Analysis I
Math 5616—Honors: Introduction to Analysis II
Math 5651—Basic Theory of Probability and Statistics
Math 5652—Introduction to Stochastic Processes
Math 5654—Prediction and Filtering

The School of Mathematics will accept the following statistics courses as part of the eight-course upper division mathematics requirement:
Stat 5101—Theory of Statistics I
Stat 5102—Theory of Statistics II

Note that the content of Stat 5101 is the same as Math 5651—Basic Theory of Probability and Statistics.

No other courses from other departments may be used as part of the eight-course math requirement, though other courses may be used as technical electives.

Math 4512—Differential Equations With Applications may not be used to satisfy part of the eight course upper division math requirements, though it may be used as technical elective

Math 3113, 3118, 4113, and 4116—Topics in Elementary Mathematics, may not be used as upper division math courses or as technical electives.

Required Courses From Other Programs

Phys 1301—Introductory Physics I
and Phys 1302—Introductory Physics II
and Phys 2303—Physics of Matter
or Phys 2311—Modern Physics
or Phys 2503—Introductory Physics for Science and Engineering III
or Phys 1401—Honors Physics I
and Phys 1402—Honors Physics II
and Phys 2403—Honors Physics III

One course in computer programming, usually one of the following:
CSci 1103—Introduction to Computer Programming in Java (3 cr)
CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers (3 cr)
CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers (4 cr)
Liberal education electives (15 cr)

Electives

Technical elective (two courses, not necessarily in mathematics, of at least 3 credits each that satisfy three requirements):

- Calculus 1271, or equivalent;
- The courses are 3xxx or higher;
- The courses form a coherent part of the student's program, as determined in consultation with the student's adviser.

Mathematics Minor

A minor in mathematics is available through the College of Liberal Arts. Students must complete all lower division requirements for the major plus two adviser-approved upper division math courses, which are approved for the major (including Stat 5101-5102).

Sample Mathematics Program

Freshman Year

Fall Semester (15 cr)
EngC 1011—University Writing and Critical Reading (4 cr)
Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Liberal education elective (3 cr)

Spring Semester (14-15 cr)
CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers (3 cr)
or CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers (4 cr)
Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Liberal education elective (3 cr)

Sophomore Year

Fall Semester (15 cr)
Math 2373—IT Linear Algebra and Differential Equations (4 cr)
Phys 2503—Introduction to Physics for Science and Engineering III (4 cr)
Liberal education elective (3 cr)
Biology with lab (4 cr)

Spring Semester (16 cr)
Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Math 3283W—Sequences, Series, and Foundations: Writing Intensive (4 cr)
Liberal education elective (4 cr)
Free elective (4 cr)

Junior Year

Fall Semester (15-16 cr)
Upper division math (3-4 cr)
Upper division math (4 cr)
Technical elective (4 cr)
Upper division composition (4 cr)

Spring Semester (16 cr)
Upper division math (4 cr)
Upper division math (4 cr)
Technical elective (4 cr)
Liberal education elective (4 cr)

Senior Year

Fall Semester (15 cr)
Upper division math (4 cr)
Upper division math (4 cr)
Free elective (7 cr)

Spring Semester (15 cr)
Upper division math (4 cr)
Upper division math (4 cr)
Free elective (7 cr)

Mechanical Engineering

Department of Mechanical Engineering

B.M.E.

The Department of Mechanical Engineering is committed to offering undergraduate and graduate education of the highest quality in mechanical and industrial engineering, to conducting significant basic and applied research in selected areas, and to providing professional service to the appropriate constituencies of a major land grant university

Mechanical engineering is involved in most technological activities of society and dominates many, including automotive, transportation and materials handling, environmental and pollution control systems, refrigeration and cryogenics, power systems design, automation, system dynamics and control, computer-aided design and manufacturing, and machinery/consumer products production. The mechanical engineer may be engaged in design, development, research, testing, manufacturing, administration, marketing, consulting, or education.

Objectives for the mechanical engineering program are:

1. to provide for study in the basic sciences, the liberal arts, engineering analysis and design in accordance with national standards and thereby provide the necessary tools for students to pursue successful careers as mechanical engineers or to seek continued graduate education.
2. to provide strong training in experimental and computational techniques and to give students the ability to work in multidisciplinary design teams to meet the needs of the modern work place. The program benefits by enrichment from research activities and strong ties to industry.
3. to give students with the ability to communicate technical information effectively, understand professional and ethical responsibilities of a mechanical engineer, and to adapt to emerging technologies through life-long learning.

The program prepares students for an industrial career in mechanical engineering or for graduate work. A strong background in the basic sciences of mathematics, physics, and chemistry is balanced with courses in engineering science and engineering design. Through electives, each student has an opportunity to develop a program of study that reflects his or her particular area of interest.

A co-op program is available during the last two years of study. Upper division status and a satisfactory GPA are required for admission. The co-op program provides applied engineering training in selected established industries during semesters of supervised assignments that alternate with semesters of University studies.

Professional training in industrial engineering is offered through an industrial engineering option. Students selecting this option complete the same set of required courses as other mechanical engineering students, but their technical electives must be selected from an approved list and in consultation with a faculty adviser. Students selecting the option may also apply to the co-op program.

The program is accredited by the Engineering Accreditation Commission of ABET.

Information is available on the Web at <www.me.umn.edu/info/ug>. Further details and information about alternative course selections, elective programs, areas of specialization, and changes in course or credit requirements are available in 1120 Mechanical Engineering (612-625-5842, e-mail u-gradinfo@me.umn.edu). Program educational objectives and program outcomes can be seen at <www.me.umn.edu/info/ug/objectives_and_outcomes>.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.50).

Degree Requirements

Students must complete at least 127 credits to graduate, including 48 credits in the major. The courses required for the degree are listed below. These include four technical electives totaling 16 credits.

Required Courses

Lower Division

ME 2011—Introduction to Mechanical Engineering (4 cr)

Upper Division

ME 3031—Basic Mechanical Measurements Laboratory (4 cr)

ME 3221—Design and Manufacturing I: Engineering Materials and Manufacturing Processes (4 cr)

ME 3222—Design and Manufacturing II (4 cr)

ME 3281—Systems, Dynamics, and Controls (4 cr)

ME 3321—Thermodynamics (4 cr)

ME 3322—Heat Transfer and Fluid Flow (4 cr)

ME 4054—Senior Design (4 cr)

ME 4x3x—Senior Laboratory (4 credits to be selected from those offered; senior lab courses are numbered ME 4x3x) (4 cr)

IE 4521—Statistics, Quality, and Reliability (4 cr)

Technical electives: four 4-credit, upper division IT courses, a minimum of two courses must be ME or IE courses.

Required Courses From Other Programs

AEM 2021—Statics and Dynamics (4 cr)

AEM 3031—Deformable Body Mechanics (3 cr)

Chem 1021—Chemical Principles I (4 cr)

CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers (4 cr)

EE 3005—Fundamentals of Electrical Engineering (4 cr)
and EE 3006—Lab (1 cr)

Math 1271, 1272 or Math 1371, 1372 or Math 1571H, 1572H—Calculus I, II (4 cr each)

Math 2243 or 2373 or 2573H—Linear Algebra and Differential Equations (4 cr)

Math 2263 2374 or 2574H—Multivariable Calculus (4 cr)

Phys 1301, 1302—Introductory Physics I, II (4 cr each)

MatS 2001 (4 cr)—Introduction to the Science of Engineering Materials (the lab associated with this class is required)

Liberal education electives (15 cr)

Sample Mechanical Engineering Program

Freshman Year

Fall Semester (16 cr)

EngC 1011—University Writing and Critical Reading (4 cr)

Math 1371—IT Calculus I (4 cr)

Phys 1301—Introductory Physics I (4 cr)

Biology with lab (4 cr)

Spring Semester (15 cr)

Chem 1021—General Principles of Chemistry I (4 cr)

Math 1372—IT Calculus II (4 cr)

Phys 1302—Introductory Physics II (4 cr)

Liberal education elective** (3 cr)

Sophomore Year

Fall Semester (16 cr)

AEM 2021—Statics and Dynamics (4 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)

MatS 2001—Introduction to Mechanical Properties* (4 cr)

ME 2011—Introduction to Mechanical Engineering (4 cr)

Spring Semester (17 cr)

AEM 3031—Deformable Body Mechanics (3 cr)

CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers (4 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)

Liberal education elective** (3 cr)

Liberal education elective** (3 cr)

Junior Year

Fall Semester (16 cr)

EE 3005—Fundamentals of Electrical Engineering Lecture (4 cr)

EE 3006—Fundamentals of Electrical Engineering Lab (1 cr)

ME 3221—Design and Manufacturing I (4 cr)

ME 3321—Thermodynamics (4 cr)

Liberal education elective** (3 cr)

Spring Semester (16 cr)

ME 3031—Basic Mechanical Measurements Lab (4 cr)

ME 3222—Design and Manufacturing II (4 cr)

ME 3322—Heat Transfer and Fluid Flow (4 cr)

Technical elective (4 cr)

The mechanical engineering program was ranked #8 in the nation in a report by the National Research Council.

Senior Year

Fall Semester (16 cr)

IE 4521—Statistics, Quality, and Reliability (4 cr)
ME 3281—System Dynamics and Controls (4 cr)
ME 4054—Senior Design (4 cr)
Technical elective (4 cr)

Spring Semester (15 cr)

ME 4x3x—Senior Lab (4 cr)
Technical elective (4 cr)
Technical elective (4 cr)
Liberal education elective** (3 cr)

** The 4-credit course has a 3-credit lecture and 1-credit lab.*

*** The assumption is that liberal education courses will each be 3 credits.*

Physics

School of Physics and Astronomy

B.S.Phys.

Mission—To add to our understanding of the physical principles governing our observable universe, to teach these principles to students at the University of Minnesota, and to use our knowledge of these principles in the service of the citizens of the state of Minnesota.

Physics is concerned with the fundamental properties and interactions of all forms of matter. Experimental and theoretical investigations are combined to formulate mathematical relationships that describe and predict the behavior of nature.

The undergraduate physics program prepares students for employment, often in industrial or governmental laboratories, or for further study at graduate or professional schools in physics, engineering, biophysics, medicine, education, law, or business.

The program integrates a broad foundation in physics that can be flexibly combined with coursework in other technical disciplines or used to specialize in physics. Students should consult a physics adviser to help formulate objectives for undergraduate study.

Technical electives are 3xxx courses and above, usually taken from courses in IT or the College of Biological Sciences, which further these objectives.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

Students must complete at least 120 credits to graduate, including 30-38 credits in the major.

Physics majors must take all required physics and mathematics courses A-F and must earn a grade of C- or better in all physics, mathematics, and technical elective courses (except those offered S-N only). Only students with grades of B or better in the introductory physics courses can generally expect to succeed in the major. Students also choose one emphasis within the program and must complete the University's liberal education requirements.

Required Courses

Core Program

Phys 1301W, 1302W, 2303 or Phys 1401V, 1402V, 2403V (12 cr)
Phys 2201—Introduction to Thermal and Statistical Physics (2 cr)
Phys 2601—Quantum Physics (4 cr)
Phys 2605—Quantum Physics Laboratory (3 cr)
Phys 4051—Methods of Experimental Physics I (5 cr)
Phys 4052W—Methods of Experimental Physics II (5 cr)

At least two of the following four courses:

Phys 4001—Analytical Mechanics (4 cr)
Phys 4002—Electricity and Magnetism (4 cr)
Phys 4101—Quantum Mechanics (4 cr)
Phys 4201—Statistical and Thermal Physics (3 cr)

One of the following four sequences:

Math 1271, 1272, 2243, 2263 or Math 1371, 1372, 2373, 2374 or Math 1571H, 1572H, 2573H (15-16 cr)
Liberal education requirements

Emphasis Requirements (choose one)

Physics Emphasis (30-33 cr)

The remaining two courses not already chosen from the list of Phys 4001, 4002, 4101, 4201 (7-8 cr)
Upper division or graduate physics elective (3-4 cr)
Upper division or graduate math elective (3-4 cr)
Technical electives (17 cr)

Engineering Emphasis (35-38 cr)

Chem 1021—Chemical Principles I (4 cr)

Two courses (or indicated substitutes) not already chosen from core program courses (7 cr):

Phys 4001 or AEM 2021 or AEM 2011-2012
Phys 4002 or EE 3601
Phys 4101, Chem 3502 or 4502
Phys 4201 or ME 3321 or ME 3324 or Chem 3501 or 4501
Technical electives (24 cr; 3xxx or higher; adviser approval required)

Biology Emphasis (34-36 cr)

BioC 3021—Biochemistry (3 cr)
Biol 1009—General Biology (counted in the liberal education requirement)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Chem 2301—Organic Chemistry I (3 cr)

Two courses (or indicated substitutes) not already chosen from core program courses (6-8 cr):

Phys 4001
Phys 4002
Phys 4101 or Chem 3502 or 4502
Phys 4201 or Chem 3501 or 4501
Technical electives in biology or related areas (14 cr; 3xxx or higher; adviser approval required)

Teaching Emphasis (30-34 cr)

Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)

One course from each of the following four groups (adviser approval required; the following are suggested courses):

History and Philosophy of Science

Phys 4111—History of Nineteenth-Century Physics (3 cr)
Phys 4121—History of Twentieth-Century Physics (3 cr)

Relativity, Astrophysics, and Cosmology

Ast 2001—Introduction to Astrophysics (4 cr)
Phys 4811—Introduction to Relativity and Cosmology (3 cr)

Earth Sciences

Geo 2201—Geodynamics I: The Solid Earth (4 cr)
Geo 3201—Geodynamics II: The Fluid Earth (4 cr)
Geo 2303—Geochemical Principles (3 cr)
Geo 3401—Geochronology and Earth History (3 cr)

Technology

AEM 4201—Fluid Mechanics
EE 5621—Physical Optics (4 cr, together with EE 5622—Physical Optics Lab)
Phys 4711—Introduction to Optics (3 cr)
Phys 5701—Solid State Physics (4 cr)

Technical electives in physics and related areas (10 cr; 3xxx or higher; adviser approval required)
Two courses in engineering, one of which has a substantial design component
Students must demonstrate knowledge of computer programming in at least one language through coursework or completion of project.
Students are strongly advised to participate in a program of voluntary secondary school teaching. Such experience is required for students wishing to enter the University's College of Education and Human Development Secondary School Graduate Program leading to certification to teach. (For information, contact Student and Professional Services, 110 Wulling Hall.) Early admission into the program is possible in the junior year.

Physics Minor

A minor is available through the College of Liberal Arts (CLA); see the physics program in the CLA Degree Programs and Minors section.

Sample Physics Program (Physics Emphasis)

Freshman Year

Fall Semester (15 cr)

EngC 1011—University Writing and Critical Reading (4 cr)
Math 1271 or 1371 or 1571H—Calculus I (4 cr)
Phys 1301W or 1401V—Introductory Physics I (4 cr)
Phys 1905—Freshman Seminar: Physics Connections (3 cr)

Spring Semester (15-16 cr)

Math 1272 or 1372 or 1572H—Calculus II (4 cr)
Phys 1302W or 1402V —Introductory Physics II (4 cr)
Technical elective (chemistry) (4 cr)
Liberal education elective (arts and humanities) (3-4 cr)

Sophomore Year

Fall Semester (15 cr)

Math 2243 or 2373 or 2573H—Linear Algebra/Differential Equations (4 cr)
Phys 2503 or 2403V—Introductory Physics III (4 cr)
Liberal education elective (history and social sciences) (3 cr)
Liberal education elective (for example, biology) (4 cr)

Spring Semester (15 cr)

Math 2263 or 2374 or 2574H (4 cr)
Phys 2601—Quantum Physics (4 cr)
Phys 2605—Quantum Physics Lab (3 cr)
Technical elective (CSci C/C++ programming) (4 cr)

Junior Year

Fall Semester (16 cr)

Phys 4001—Analytical Mechanics (4 cr)
Phys 4051—Methods of Experimental Physics I (5 cr)
Math elective (4 cr)
Open elective (3 cr)

Spring Semester (16 cr)

Phys 4002—Electricity and Magnetism (4 cr)
Phys 4052W—Methods of Experimental Physics II (5 cr)
Technical elective (4 cr)
Liberal education elective (3 cr)

Senior Year

Fall Semester (14 cr)

Phys 4101—Quantum Mechanics (4 cr)
Phys 4201—Statistical and Thermal Physics (3 cr)
Technical elective (3 cr)
Liberal education elective (4 cr)

Spring Semester (15 cr)

Physics or astrophysics elective (4 cr)
Technical elective (for example, lab project) (4 cr)
Liberal education elective (4 cr)
Open elective (3 cr)

Statistics

School of Statistics

B.S.Stat.

Mission—To provide a logical framework for the collection, analysis, and interpretation of data. This data can be used to draw inferences in scientific studies and to make decisions and predictions in industrial, business, and governmental enterprises.

The School of Statistics offers a four-year curriculum leading to a bachelor of science degree. Statistics deals with methods and theories of data collection, tabulation, analysis, and interpretation, and with the use of data for inference and decision making in industrial, scientific, and government enterprises.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 38 credits in the major. Required are two years of math, a year of statistical theory, five courses in statistical methods, three courses with lab in the sciences, and three electives courses in statistics or related fields.

Required Courses

Stat 3011—Introduction to Statistical Analysis
or Stat 3021—Introduction to Probability and Statistics
Stat 3022—Data Analysis
Stat 4101-4102—Theory of Statistics I-II
or Stat 5101-5102—Mathematical Statistics I-II
At least 10 credits of adviser-approved statistics electives chosen from Stat 5031, 5041, 5201, 5302, 5303, 5401, 5421, 5601
Math 1271, 1272 or Math 1371, 1372 or Math 1571H, 1572H—Calculus I-II
Math 2263 or 2374 or 2574H—Multivariable Calculus
Math 2243—Linear Algebra and Differential Equations (4 cr)
Math 4242—Applied Linear Algebra

One course among the following three:

CSci 1103—Introduction to Computer Programming in Java
CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers
CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers
Three courses with lab, chosen from at least two of the fields of physics, chemistry, biology
Three adviser-approved courses in statistics or related fields such as computer science, biostatistics, industrial engineering/operations research, mathematics

Statistics Minor

At least 14 credits from 3xxx-5xxx School of Statistics courses, including at least two 5xxx courses.

Course Descriptions

Course Descriptions

Course Numbers, Symbols, and Abbreviations

The courses in this catalog are not offered every semester. To find out whether a course is offered during a particular semester, consult the *Class Schedule*.

Course Numbers

0xxx Courses that do not carry credit toward any University degree.

1xxx Courses primarily for undergraduate students in their first year of study.

2xxx Courses primarily for undergraduate students in their second year of study.

3xxx Courses primarily for undergraduate students in their third year of study.

4xxx Courses primarily for undergraduate students in their fourth year of study; graduate students may enroll in such courses for degree credit. 4xxx courses can be counted for a Graduate School degree if the course is taught by a member of the graduate faculty or an individual appointed to Limited Teaching Status (LTS).

5xxx Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Abbreviations

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

Prereq ..... Course prerequisites.

cr ..... credit.

div ..... division.

DUS ..... Director of Undergraduate Studies.

equiv ..... equivalent.

fr, soph, jr, sr ..... freshman, sophomore, junior, senior.

H ..... Honors. Courses with an H following the course number satisfy honors requirements.

V ..... Honors and Writing Intensive. Courses with a V following the course number satisfy both honors and liberal education writing intensive requirements.

W ..... Writing Intensive. Courses with a W following the course number satisfy the writing intensive requirement for liberal education.

Department Designators

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

Course Symbols

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

! ..... Work for this course will extend past the end of the term. A grade of K will be assigned to indicate that the course is still in progress.

† ..... All courses preceding this symbol must be completed before credit will be granted for any semester of the sequence.

§ ..... Credit will not be granted if credit has been received for the course listed after this symbol.

¶ ..... Concurrent registration is required (or allowed) in the course listed after this symbol.

..... Approval of the instructor is required for registration.

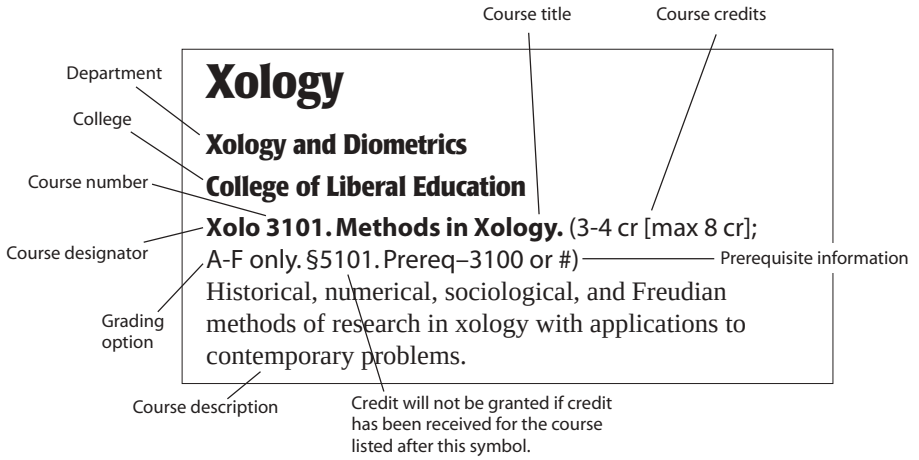
Δ ..... Approval of the department offering the course is required for registration.

❑ ..... Approval of the college offering the course is required for registration.

, ... In prerequisite listings, comma means "and."

1-4 cr [max 6] ... The course can be taken for 1 to 4 credits and may be repeated for up to 6 credits.

Course Listing Sample



The courses in this catalog are current as of March 28, 2002. Check the University Catalogs Web site at <www.catalogs.umn.edu> for the most current course information.

Accounting (Acct)

Department of Accounting

Curtis L. Carlson School of Management

Acct 2050. Introduction to Financial Reporting. (4 cr; A-F only. Prereq–Completion of 26 credits)
Introduction to financial accounting for U.S. organizations. Reading and understanding U.S. financial statements.

Acct 3001. Introduction to Management Accounting. (3 cr; A-F only. Prereq–2050, 50 cr)
Costing techniques, including activity-based costing. Applying costing methods to determine costs of products, services, and production processes. Use of costs in operating/strategic decisions.

Acct 3199. Internship in Public Accounting. (2 cr; S-N only. Prereq–5125, #)
Full-time work for a public accounting firm plus a written report on the work experience.

Acct 3201. Intermediate Management Accounting. (2 cr; A-F only. Prereq–3001, acct or finance major)
Activity-based costing techniques in specific industries including service firms. Other topics could include costing for Just-in-Time manufacturing, tracking customer profitability, and costing quality.

Acct 3299. Internship in Management Accounting. (2 cr; S-N only. Prereq–Acct 3201, #)
Full-time work in general accounting, cost accounting, or internal auditing in an industrial or governmental organization plus a written report analyzing the work experience.

Acct 5100. Corporate Financial Reporting. (4 cr; A-F only. Prereq–Mgmt student, non-accounting major)
Overview of asset/liability valuation and income measurement. Focus on how economic events are reported in the financial statements. Examines accounting theory and the accounting standard-setting process.

Acct 5101. Intermediate Accounting I. (4 cr; A-F only. Prereq–Grade of at least B- in 2050, [mgmt major or mgmt grad student])
Valuation, measurement, and reporting issues related to selected assets/liabilities of a firm. Theory underlying accounting issues. Applying accounting principles.

Acct 5102. Intermediate Accounting II. (4 cr; A-F only. Prereq–5101; mgmt or grad mgmt student)
Basic valuation problems encountered in financial reporting. Focuses on valuation of liabilities. Accounting for leases, pensions, and deferred taxes. Introduces consolidated financial statements.

Acct 5125. Auditing Principles and Procedures. (4 cr; A-F only. Prereq–[3101/5101 or 5100/6100], [accounting major or grad mgmt student])
Auditing financial information systems. Independent audits and internal auditing. Ethics. Legal responsibilities.

Acct 5126. Internal Auditing. (2 cr; A-F only. Prereq–[3101/5101 or 5100/6100], 3001)
Financial and operational auditing. Standards. Managing the function.

Acct 5135. Fundamentals of Federal Income Tax. (4 cr; A-F only. Prereq–2050 or 8030 or 8130, [mgmt or grad mgmt student])
Introduction to the U.S. federal system of taxation. Concepts of gross income, deductions, and credits. Analysis of the structure of the Internal Revenue Code and its provisions with respect to specific areas of the law. Examination of the interrelationships between legislative, judicial and administrative authority. Introduces the various methods, tools and techniques to conduct tax research.

Acct 5150. Current Financial Accounting Issues. (2 cr; A-F only. Prereq–MBT student; 2050)
Accounting principles and practices underlying preparation of financial statements and additional disclosures. Includes recent pronouncement on financial accounting.

Acct 5160. Financial Statement Analysis. (2 cr; A-F only. Prereq–[5100/6100 or 3101/5101], [accounting or finance major])
Interpretation/analysis of financial statements. Introduces basic techniques of financial statement analysis and applies them in different settings (e.g., in investment/credit decisions).

Acct 5180. Consolidations and Advanced Reporting. (2 cr; A-F only. Prereq–5102, mgmt or mgmt grad student)
Theory underlying the preparation of consolidated financial statements, as well as the mechanical computations needed to prepare the statements themselves.

Acct 5200. Tax Accounting Methods and Periods. (4 cr; A-F only. Prereq–MBT student; 5135)
Rules affecting timing of income and deductions for tax purposes. Examination of cash and accrual accounting methods on an overall basis and with respect to individual items of income and deductions; rules for changing accounting methods and periods; annual accounting and transactional concepts, including the claim of right doctrine, the Arrowsmith doctrine, and the tax benefit rule.

Acct 5220. Tax Research, Communication, and Practice. (4 cr; A-F only. Prereq–MBT student; 5135)
In-depth treatment of tax research methodology including tax questions, locating potential authority, assessing potential authority, and communicating research results. Substantive material on dealing with the IRS including sources of IRS policy; processing returns, auditing returns; rulings and determination letters; closing agreements; assessments and collections.

Acct 5230. Corporate Taxation I. (2 cr; A-F only. Prereq–MBT student; 5135)
Federal income taxation of corporations and shareholders. Organization of a corporation; establishment of its capital structure; determination of its tax liability; dividends and other nonliquidating distributions; stock redemptions, and liquidations.

Acct 5236. Introduction to Taxation of Business. (2 cr; A-F only. Prereq–5135, acct major)
Introduction to the income tax laws governing the taxation of corporations, partnerships, limited liability companies, limited liability partnerships, and S corporations. Students will also increase their knowledge and skills related to tax research by writing research memorandums.

Acct 5271. Accounting Information Systems. (2 cr. Prereq–3101/5101 or 5100/6100)
Applications of electronic data processing systems in accounting, including modeling, financial planning, auditing, and data security. Analysis/design of accounting information systems.

Acct 5281. Special Topics in Financial Reporting. (2 cr; A-F only. Prereq–5102, mgmt or grad mgmt student)
Covers areas of financial reporting frequently covered on the CPA exam, including partnerships, foreign operations, and accounting for government and nonprofit organizations.

Acct 5310. International Accounting. (2 cr; A-F only. Prereq–2050, mgmt student)
Review of macroeconomic concepts of international economics, including trade, international markets for capital, and the role of accounting. Survey of different accounting policies and approaches among nations. Reading and understanding financial statements produced in countries other than the United States.

Acct 5320. Current Topics in Accounting. (2 cr; A-F only. Prereq–5102, acct major)
Topics vary.

Acct 5325. Advanced Tax Principles. (2 cr; A-F only. Prereq–5135, MBT student)
In-depth coverage of issues affecting all tax entities, focusing on topics pertaining to individuals and partnerships: at-risk provisions, passive activity loss rules, Alternative Minimum Tax/AMT credit for individuals, tax benefit rule and claim of right doctrine, like-kind exchanges of personal property, net operating losses, hobby losses, and business/rental use of residences.

Acct 5330. Taxation of Corporations II. (2 cr; A-F only. Prereq–5230, MBT student)
Corporate readjustments related to multiple corporations and consolidated returns.

Acct 5333. Tax Aspects of Consolidated Returns. (2 cr; A-F only. Prereq–5230, MBT student)
Covers aspects of filing consolidated federal income tax returns. Includes determining affiliated groups; election and filing requirements; intercompany transactions, limitations on certain loss and credit carryforwards; allocation of federal income tax liability; E&P and investment basis adjustments; loss allowance rules; and excess loss accounts.

Acct 5335. Taxation of the Small Business Corporation. (2 cr; A-F only. Prereq–5230, MBT student)
Federal income taxation of S corporations. Election eligibility; termination of status; treatment of income and deduction items; distributions, basis of stock and debt. Compensation arrangements in closely held corporations; fiscal year issues; personal service corporations; advantages of C corporations vs. S corporations; corporation liquidation and redemption rules; S corporation's built-in gains tax.

Acct 5340. Taxation of Partners and Partnerships. (2 cr; A-F only. Prereq–5135, MBT student)
Reviews tax consequences associated with formation, operation, and dissolution of a partnership.

Acct 5350. Taxation of Estates and Gifts. (2 cr; A-F only. Prereq–5135, MBT student)
Taxation of transfers under federal estate and gift tax laws. Includes property owned by the decedent; retained life estates; transfers taking effect at death; revocable transfers; joint interest; powers of appointment; valuation problems; expenses, debts and taxes; charitable bequests, marital deduction, taxable inter vivos gifts, splitting and credits.

Acct 5351. Estate Planning. (2 cr; A-F only. Prereq–5135, MBT student)
Addresses various topics related to planning the transfer of property during lifetime and at death.

Acct 5353. Income Taxation of Fiduciaries. (2 cr; A-F only. Prereq–5135, MBT student)
Simple, complex, and revocable trusts; estates; accumulation distributions, income in respect of decedents; trust accounting income and principal; distributable net income; terminations; and excess distributions.

Acct 5356. Taxation of Compensation Arrangements. (2 cr; A-F only. Prereq–5135, MBT student)
Federal income taxation of corporate deferred compensation and fringe benefits with emphasis on pension plans, profit sharing plans, stock option plans, individual retirement accounts, annuities and insurance, medical related compensation benefits, and reporting requirements.

Acct 5360. State and Local Taxation. (2 cr; A-F only. Prereq–5135, MBT student)
Examines state levying of individual income, corporate income, property, sales, and excise taxes. Tax problems of businesses with multistate operations.

Acct 5370. Taxation of Property Transactions. (2 cr; A-F only. Prereq–5135, MBT student)
Determining realized gain or loss and recognized gain or loss, and tax treatment of that gain or loss on property dispositions. Consequences of property transactions including depreciation, depletion, basis, and capital gains problems.

Acct 5380. Tax Aspects of International Business I. (2 cr; A-F only. Prereq–5230, MBT student)
Multinational business operations and transactions involving foreign income. Tax consequences of transactions with foreign organizations and by related foreign companies.

Acct 5381. Tax Aspects of International Business II. (2 cr; A-F only. Prereq–5380, MBT student)
Foreign tax credit and Subpart F planning opportunities, international structuring (including joint ventures and use of the new entity classification regulations), transfer pricing, and foreign currency. Recent legislative, regulatory, and judicial

developments in the international tax area, and the challenges and opportunities presented by these developments.

Acct 5390. Topics in Taxation. (1-4 cr [max 24 cr]. Prereq–MBT student)
Current tax legislation and problems. Topics may vary. S-N grading allowed with MBT program approval.

Acct 5500. Business, Government, and Economic Tax Policy. (4 cr. Prereq–5135, MBT student)
Modern macroeconomics and its effects on taxation and public finance including government expenditures. History of taxation and the institution and individuals affecting tax policy. Goals of an effective tax system and various proposed major tax reforms.

Adult Education (AdEd)

Department of Work, Community, and Family Education

College of Education and Human Development

AdEd 5001. Survey: Human Resource Development and Adult Education. (3 cr)
Overview of fields of human resource development and adult education. Includes societal context, systems theory, processes, definitions, philosophies, goals, sponsoring agencies, professional roles, participants, and resources. Emphasis on the unique characteristics and ways the fields overlap and enhance one another.

AdEd 5101. Strategies for Teaching Adults. (3 cr; A-F only)
Psychological theories of adult learning; learning styles and personality types; teaching styles; group and team learning; moderating and study circles; teaching technologies and distance learning; gender, race, and cultural communication. Applications of strategies.

AdEd 5102. Perspectives of Adult Learning and Development. (3 cr)
Emphasis on major adult development theorists, theories, and current applications. Transformative learning, self-directed learning, experiential learning, and cooperative learning provide theoretical framework for exploring physiological, psychological, sociological, and cultural aspects of adult development through the life span.

AdEd 5103. Designing the Adult Education Program. (3 cr; A-F only)
Designing and implementing educational programs for adults. Application of concepts, theories, and models in different adult learning situations.

AdEd 5196. Field Experience in Adult Education. (3-6 cr [max 6 cr]; S-N only)
Supervised fieldwork and practice. Presentations and evaluations of adult education practices.

AdEd 5201. Introduction to Adult Literacy. (3 cr)
Definitions of literacy: workplace, community and family. Issues: poverty, welfare, ethnicity, cultural diversity, social class, language and learning, immigrants. Review of literacy programs, funding, and professionalization. Reaching and recruiting undereducated adults. The role of the family and schools; community, state and local government. New social action approaches required for licensure.

AdEd 5202. Assessment of Adult Literacy. (3 cr)
Assessment of adult literacy problems as they affect work, family and community. Setting educational goals; formal versus informal assessment; case studies; educational planning.

AdEd 5203. Methods of Teaching Adult Literacy. (3 cr)
Approaches to teaching reading, writing, and mathematics to adults. Technology as a teaching tool. Teaching students with disabilities. Cultural and gender differences. English as a second language. Evaluation of commercial materials and software.

AdEd 5301. Survey of Distance Education. (3 cr)
Survey of distance education concepts, theory, history, present practice, delivery systems, course design, major issues, and future directions.

AdEd 5302. Continuing Education for Professionals. (3 cr)
Analysis of philosophies, issues, policies, trends, professional needs and statutory requirements in continuing professional education programs. Role of the program director and organization.

AdEd 5303. Working with Volunteers in Community Settings. (3 cr)
Uses collaborative, experiential methods to address fundamental issues and practices in volunteer development. Explore personal philosophies, staffing, and key issues and trends in the administration of volunteer programs.

AdEd 5611. Futurism in Human Resource Development and Adult Education. (3 cr)
Implications of future developments in areas of theory/practice in human resource development and adult education.

AdEd 5612. Managing and Consulting in Human Resource Development and Adult Education. (3 cr. Prereq–5001W or HRD 5001W)
Theory of managing/consulting in human resource development and adult education. Assessment of role requirements. Experimentation with practical management/consultation processes/techniques.

AdEd 5700. Special Topics in Adult Education. (1-8 cr [max 12 cr])
Exploration of issues, methods, and knowledge in areas of adult education. Content varies.

Aerospace Engineering and Mechanics (AEM)

Department of Aerospace Engineering and Mechanics

Institute of Technology

AEM 2011. Statics. (3 cr; A-F only. Prereq–Phys 1301, [¶Math 2374 or equiv], IT)
Force/moment vectors, resultants. Principles of statics and free-body diagrams. Applications to simple trusses, frames, and machines. Distributed loads. Internal forces in beams. Properties of areas, second moments. Laws of friction.

AEM 2012. Dynamics. (3 cr; A-F only. Prereq–2011, [¶Math 2373 or equiv], IT student)
Kinematics/kinetics of particles. Newton's laws. Energy/momentum methods. Systems of particles. Kinematics/kinetics of planar motions of rigid bodies. Plane motion of rigid bodies. Mechanical vibrations.

AEM 2021. Statics and Dynamics. (4 cr; A-F only. Prereq–[¶Math 2374 or equiv], Phys 1301, IT)
Force/moment vectors, resultants. Principles of statics and free-body diagrams. Applications to simple trusses, frames, and machines. Properties of areas, second moments. Internal forces in beams. Laws of friction. Principles of particle dynamics. Mechanical systems and rigid-body dynamics. Kinematics/dynamics of plane systems. Energy/momentum of 2-D bodies/systems.

AEM 2301. Mechanics of Flight. (3 cr; A-F only. Prereq–[¶Math 2373 or equiv], Phys 1301, IT)
Standard atmospheric properties, basic aerodynamics, generation of lift/drag. Airfoils and finite wings. Elements of aircraft performance, atmospheric flight mechanics, wind tunnel experiments. Experimental determination of lift/drag. Introduction to MatLab.

AEM 3031. Deformable Body Mechanics. (3 cr; A-F only. Prereq–[2011 or 2021], [Math 2374 or equiv], [¶Math 2373 or equiv], IT)
Uniaxial loading/deformation. Stress/strain at a point, Mohr's circle. Internal forces in beams. Material behavior, linear elasticity. Torsion of circular shafts. Bending of beams of symmetrical section. Column buckling. Statically indeterminate structures.

AEM 4201. Fluid Mechanics. (4 cr; A-F only. Prereq–2012, [Math 2373 or equiv], [Math 2374 or equiv], [IT upper div or grad student])
First course in fluid mechanics. Stress/strain rate descriptions, fluid statics. Use of differential and finite control volume analysis with continuity. Momentum/energy equations, Bernoulli/Euler equations, vorticity, potential flow, incompressible viscous flow using Navier-Stokes equations, dimensional analysis, pipe flow, boundary layers, separation, introduction to turbulence.

AEM 4202. Aerodynamics. (4 cr. Prereq–Upper div IT or grad, 4201)
Inviscid aerodynamics. Subsonic, transonic, and supersonic airfoil theory; wing theory. Introduction to compressible flow, normal and oblique shock waves, Prandtl-Meyer expansions. Linearized compressible flow. Wing-body combinations. Computational aerodynamics methods.

AEM 4203. Aerospace Propulsion. (4 cr. Prereq–4202, [IT upper div or grad student])
Basic one-dimensional flows: isentropic, area change, heat addition. Overall performance characteristics of propellers, ramjets, turbojets, turbofans, rockets. Performance analysis of inlets, exhaust nozzles, compressors, burners, and turbines. Rocket flight performance, single-/multi-stage chemical rockets, liquid/solid propellants. Design problems. Design project with technical report.

AEM 4245. Hypersonic Aerodynamics. (3 cr. Prereq–Upper div IT or grad, 4202)
Importance and properties of hypersonic flow. Hypersonic shock and expansion-wave relations. Local surface inclination methods. Approximate and exact methods for hypersonic inviscid flow fields. Viscous flow: boundary layers, aerodynamic heating, hypersonic viscous interactions, computational methods. Hypersonic propulsion and vehicle design.

AEM 4251. Computational Fluid Mechanics. (3 cr. Prereq–[4201 or CS 1113 or equiv], [IT upper div or graduate student])
Introductory concepts in finite difference and finite volume methods as applied to various ordinary/partial differential model equations in fluid mechanics. Fundamentals of spatial discretization and numerical integration. Numerical linear algebra. Introduction to engineering and scientific computing environment. Advanced topics may include finite element methods, spectral methods, grid generation, turbulence modeling.

AEM 4295. Problems in Fluid Mechanics. (1-3 cr [max 6 cr]. Prereq–Δ)
Topics of current interest. Individual projects with consent of faculty sponsor.

AEM 4301. Spaceflight Dynamics. (3 cr. Prereq–[2012 or equiv], [Math 2373 or equiv], [IT upper div or grad student])
Two-body problem, Earth-satellite operations, rocket performance, reentry dynamics, space environments, restricted three-body problem, interplanetary trajectories, numerical simulations, elementary spacecraft attitude control. Design project.

AEM 4303. Flight Dynamics and Control. (3 cr. Prereq–IT upper div or grad, 2301, or #)
Reference frames, kinematics, equations of motion for a rigid body. Forces and moments, trim, linearization, dynamic response characteristics for aircraft and spacecraft. Aircraft stability derivatives, static longitudinal and lateral stability. Handling qualities. Phugoid, short period, spiral, roll subsidence, dutch roll modes, approximations, transfer functions. Use of MatLab for dynamic analysis. Design project.

AEM 4311. Automatic Control Systems. (4 cr. Prereq–IT upper div or grad, 4303 or equiv)
Analysis and synthesis of automatic control systems. Transfer functions. Root locus, Nyquist and Bode techniques. Introduction to state space formulation. Applications, design project, lab.

AEM 4331. Aerospace Vehicle Design I. (3 cr. Prereq–[2301, AEM sr] or #)
Students work in teams/disciplines to design aerospace vehicle. Design process, project environment, mission requirements, trade studies, vehicle sizing, performance, stability/control, propulsion, trajectory analysis, CAD/vehicle integration, systems/equipment, operating envelopes, baseline specification, certification. Professional ethics/responsibilities. Students keep design log. Oral presentation, written report.

AEM 4332W. Aerospace Vehicle Design II. (4 cr. Prereq–[4331 or #], [EngC 1011 or equiv])
Students work in project groups to design/build/test model of vehicle designed in 4331. Design, proposals, schedules/milestones/critical-path, CAD/CAM, drawings/specifications, control systems, weight/balance envelopes, test matrix, structural analysis/testing, wind tunnel/water channel testing, flight testing, certification. Professional ethics. Design log, status reports, written report, oral presentation.

AEM 4351. Aerodynamic Decelerator Systems. (3 cr. Prereq–2012, 2301, [IT upper div or grad student])
Parachutes, other aerodynamic decelerators. Types, applications. Drag coefficients and steady descent. Stability. Deployment and opening forces. Apparent mass effects, trajectory analysis, engineering properties of textile materials, design projects.

AEM 4371. Helicopter Aerodynamics. (3 cr. Prereq–2301, 4202, [IT upper div or grad student])
Review of basic aerodynamics, unique features of helicopters, momentum theory in axial flight and in rotor flow states, momentum theory in non-axial flight, blade-element theory, vortex theory, helicopter equations of motion. Design project.

AEM 4441. Structural Dynamics. (3 cr. Prereq–IT upper div or grad, 4301, 3031)
Frequency and time domain analysis of multi-degree of freedom mechanical systems; natural frequencies and normal modes of vibration; free and forced vibrations of strings, rods, shafts beams; Introduction to finite elements in structural dynamics. Design project.

AEM 4495. Problems in Dynamics and Control. (1-3 cr [max 6 cr]. Prereq–Δ)
Topics of Current interest. Individual projects with consent of faculty sponsor.

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

AEM 4502. Computational Structural Analysis. (3 cr. Prereq–[Grade of at least C in 4501, [IT upper div or grad student]] or #)
Application of finite element methods to problems in structural analysis. Emphasizes properly posing problems and interpreting calculation results. Use of commercial FEA packages. Introduction to theory of finite elements.

AEM 4511. Mechanics of Composite Materials. (3 cr. Prereq–3031, [IT upper div or grad student])
Analysis, design, and applications of laminated and chopped fiber reinforced composites. Micro-/macro-mechanical analysis of elastic constants, failure, and environmental degradation. Design project.

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

AEM 4595. Problems in Mechanics and Materials. (1-3 cr [max 6 cr]. Prereq–Δ)
Topics of current interest. Individual projects with consent of faculty sponsor.

AEM 4601. Instrumentation Laboratory. (3 cr. Prereq–CSci 1113, EE 3005, EE 3006, [upper div IT or grad student])
Introduction to lab instrumentation. Computerized data acquisition. Statistical analysis of data. Time series data, spectral analysis. Transducers for measurement of solid, fluid, and dynamical quantities. Design of experiments.

AEM 4602W. Aeromechanics Laboratory. (4 cr. Prereq–[IT upper div or grad student], 4201, 4501, 4601, [EngC 1011 or equiv])
Experimental methods/design in fluid/solid mechanics. Wind tunnel/water channel experiments with flow visualization, pressure, velocity, force measurements. Measurement of stresses, strains, displacements in solids/ structures, including stress concentrations, aerospace materials behavior, structural dynamics. Computerized data acquisition/analysis, error analysis, data reduction. Experiment design. Lab. Reports. Writing intensive.

AEM 4651. Aeroelasticity. (3 cr. Prereq–IT upper div or grad, 4301, 4202)
Static aeroelastic phenomena, torsional divergence of a lifting surface, control surface reversal; aeroelastic flutter, unsteady aerodynamics; problems of gust response, buffeting. Design project.

AEM 4796. Professional Experience. (1-3 cr [max 3 cr]; A-F only. Prereq–IT upper div, AEM major, Δ)
Work experience with substantive engineering component. Written report. Number of credits awarded based on extent of experience.

AEM 4821. Aerospace Engineering and Mechanics Honors Thesis I. (3 cr. Prereq–Upper div AEM honors student, Δ)
Individual projects under direction of AEM faculty member.

AEM 4822W. Aerospace Engineering and Mechanics Honors Thesis II. (3 cr. Prereq–upper div AEM honors student, Δ)
Individual projects under the direction of AEM faculty member.

AEM 4896. Industrial Assignment. (2 cr [max 8 cr]. Prereq–IT Upper Div, AEM major, Regis in AEM Internship Program, Δ)
Engineering internship in industry. Technical report required.

AEM 5401. Intermediate Dynamics. (3 cr. Prereq–IT upper div or grad, 2012, Math 2243)
Three-dimensional Newtonian mechanics, kinematics of rigid bodies, dynamics of rigid bodies, generalized coordinates, holonomic constraints, Lagrange equations, applications.

AEM 5501. Continuum Mechanics. (3 cr. Prereq–IT upper div or grad, 3031, Math 2243 or equiv or #)
Concepts common to all continuous media; elements of tensor analysis; motion, deformation, vorticity; material derivatives; mass, continuity equation; balance of linear, angular momentum; geometric characterization of stress; constitutive equations.

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

Aerospace Studies (Air)

Department of Aerospace Studies (Airforce ROTC)

Office of the Executive Vice President and Provost

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

Air 1104. Introduction to the Air Force Today I. (1 cr; A-F only)
Mission and organization of the Air Force, officership and professionalism, military customs and courtesies, Air Force officer opportunities, group leadership problems, and introduction to communication skills.

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

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

Air 1205. Quality Air Force, Group Leadership Problems, and Presentation Techniques. (1 cr; A-F only)
Leadership and followership. Officership, ethics, and values; Air Force's core values. Air Force heritage and leaders, Quality Air Force, group leadership problems, and continuing application of communicative skills.

Air 3301. Air Force Leadership, Quality, and Communication. (3 cr; A-F only)
Study of leadership, quality management fundamentals, and communication skills required of an Air Force junior officer. Case studies.

Air 3302. Air Force Officership, Quality, and Communication. (3 cr; A-F only. Prereq–3301 recommended)
Focus on completing Quality Air Force training, learning the Officer Professional Development system, exploring leadership styles, ethics, core values, character development, and standards of conduct. Improve written and oral communication skills. Case studies.

Air 3401. National Security Policy. (3 cr; A-F only)
National security process, regional studies, advanced leadership ethics, Air Force doctrine, and military justice. Military as a profession, officership, civilian control of the military, preparation for active duty, and current issues affecting military professionalism. Focus on refining communication skills.

Air 3402. Preparation for Active Duty. (3 cr; A-F only)
National security process, regional studies, advanced leadership ethics, and Air Force doctrine. Military law, current issues affecting military professionalism, and preparation for active duty as a second lieutenant in the U.S. Air Force.

African American and African Studies (Afro)

Department of African American and African Studies

College of Liberal Arts

Afro 1011. Introduction to African American Studies. (3 cr)
The study of peoples of African descent including the evolution of African American culture, comparative race relations, feminism and social policy change.

Afro 1021. Introduction to Africa. (3 cr)
Diverse themes and disciplines in African Studies from prehistory to post-colonial period. Introduction to methodologies of inquiry.

Afro 1221. Beginning Swahili. (4 cr)
Introduction to basic skills: comprehension, speaking, reading and writing.

Afro 1222. Beginning Swahili. (4 cr. Prereq–1221 or equiv)
Continuation of skill development from 1221.

Afro 1902. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr with no more than 36 cr)
Topics specified in *Class Schedule*.

Afro 1909W. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr with no more than 36 cr)
Topics specified in *Class Schedule*.

Afro 3001. West African History: Early Times to 1800. (3 cr)
West Africa from late prehistoric times to establishment/histories of states. Relations with North African, Mediterranean, Asian, and American worlds. Examines non-centralized patriarchal authority.

Afro 3002. West African History: 1800 to Present. (3 cr)
West African history from late-18th century to present. Themes include study of continuities with the past and profound changes including new 19th century state formation, European colonialism, and post-colonial issues.

Afro 3061. The Black Family. (3 cr)
A sociological view of African American family life in the United States.

Afro 3072. Racism: Social and Psychological Consequences for Black Americans. (3 cr)
Racism and its effects on African Americans; definitions, determinants, and dynamics. Examined in an experiential context to reflect individual and institutional racism.

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

Afro 3141. Africa. (3 cr)
Regional differentiation of human groups and environments; cultural contact and problems of underdeveloped countries south of the Sahara.

Afro 3204. History of South Africa to 1910. (3 cr. §Hist 3434)
Introductory survey of the history of South Africa from early humans to the arrival of the first Dutch settlers at the Cape of Good Hope in 1652 to the formation of the Union of South Africa in 1910.

Afro 3205. History of South Africa from 1910. (3 cr. §Hist 3435)
The history of South Africa from the Union to the present. Focus on such issues as African and Afrikaner nationalism, structures of apartheid, forced population removals, divestment and sanctions, and the post-apartheid era.

Afro 3225. Third Semester Swahili. (4 cr. Prereq–1 yr Swahili or equiv)
Readings of contemporary Swahili texts. Review of grammar and complex verb forms, building vocabulary and communication skills.

Afro 3226. Fourth Semester Swahili. (4 cr. Prereq–3225 or equiv)
Advanced Swahili readings, speaking, and writing practice.

Afro 3251W. Sociological Perspectives on Race, Class, and Gender. (3 cr; A-F only)
Race, class, and gender as aspects of social identity and as features of social organization. Experiences of women of color in the United States. Family life, work, violence, sexuality/reproduction, possibilities for social change.

Afro 3301. The Music of Black Americans. (3 cr)
Musical contributions of African American artists and innovators from 1619 to the present. Musical genres explored include spirituals, blues, ragtime, gospel, art music, and jazz.

Afro 3334. Black Women: Interdisciplinary Perspectives. (4 cr)
Interdisciplinary study of the experience of African American women, including economic, political, and social factors, psycho-sexual development, and family roles.

Afro 3405. The African American Child. (3 cr)
Research carried out by African American psychologists and behavioral/social scientists, and by experts on African American child/youth development.

Afro 3431. History of Africa to 1800. (4 cr)
Socioeconomic, political, and cultural development in precolonial Africa from ancient Egypt through the era of the trans-Atlantic slave trade.

Afro 3432. History of Africa: 1800 to Present. (4 cr)
Socioeconomic, political, and cultural development in Africa from the abolition of the trans-Atlantic slave trade through the postcolonial era.

Afro 3543. Psychology and the Black American Experience. (3 cr)
Historical and contemporary perspectives of the relationship between the area of psychology and African Africans in research and practice.

Afro 3578. Arts of Africa. (3 cr. §ArtH 3578)
Survey of the diverse arts of Africa, from ancient times to present. Visual arts of several civilizations. Relation of visual arts to larger cultural issues (religion, cosmology, gender, identity, political power).

Afro 3591. Introduction to African American Literature. (3 cr)
Afro-American autobiography, fiction, essay, poetry, drama, and folklore from the late-18th century to the present.

Afro 3591W. Introduction to African American Literature. (3 cr)
Afro-American autobiography, fiction, essay, poetry, drama, and folklore from the late-18th century to the present.

Afro 3592. Introduction to Black Women Writers in the United States. (3 cr)
The literature of African American women writers explored in novels, short stories, essays, poetry, autobiographies, and drama from the 18th to the late-20th century.

Afro 3598. Arts of the African Diaspora. (3 cr. §ArtH 3598)
Survey of African cultural heritage in art/architecture of African Diaspora in USA, Latin America, and Caribbean. Focuses on traditions retained. Addition/reformation of identities through artistic, architectural, religious syncretism.

Afro 3601. Introduction to African Literature. (3 cr)
Oral and written literature of the 19th and 20th centuries. Emphasis on literature written in English and French. All readings in English.

Afro 3625. Black Women Writers in the Diaspora. (3 cr)
Works of black women writers from Europe, Africa, South America, and the Caribbean. Novels, drama, films, and essays.

Afro 3654. African Cinema. (3 cr)
Films by African filmmakers from West, Central, and Southern Africa. Aesthetic, theoretical, and sociocultural issues will be explored through class screenings and critical readings.

Afro 3741. Racial Minorities and the Mass Media. (3 cr; A-F only. Prereq–Jour majors must have course approved on program plan; pre-jour should not enroll)
Past and present depictions of minority individuals and groups in movies, literature, radio/TV, etc., as seen against anthropological, psychological, and sociological knowledge and experience. Emphasis on personal and political effects of media depictions.

Afro 3864. African American History: Slavery through Reconstruction. (3 cr)
Importance of dynamics of class, gender, region, and political ideology. Changing nature of race/racism.

Afro 3865. African American History Survey: 1890 to Present. (4 cr. §Hist 3865)
Internal migrations, industrialization/unionization, the Great Depression, world wars, large scale movements for social/political change.

Afro 3910. Topics in Afro-American and African Studies. (3 cr [max 9 cr])
Topics specified in *Class Schedule*.

Afro 3991. Senior Thesis Preparation in Afro-American and African Studies. (1.5 cr; A-F only. Prereq–Completed composition requirement)
Senior thesis/project. Development of bibliography and thesis statement.

Afro 3992. Senior Thesis/Project. (1.5 cr. Prereq–3991)
Research and writing of a draft and final senior thesis in Afro-American and African Studies.

Afro 3993. Directed Study. (1-3 cr. Prereq–#, Δ, ❑)
Guided individual research and study.

Afro 4001. Seminar: History of Women in South Africa. (3 cr)
The changing role and status of women in South Africa from precolonial era to the present, and relationships to political, social, and economic development.

Afro 4013. Cities in Africa: African, Islamic, European Traditions. (3 cr)
History of African cities, their common and unique features. Case study of Swahili cities. Roots and issues of 20th century urban growth.

Afro 4231. The Color of Public Policy: African Americans, American Indians, and Chicanos in the United States. (3 cr)
Examination of structural or institutional conditions through which people of color have been marginalized in public policy. Critical evaluation of social theory in addressing the problem of contemporary communities of color in the United States.

Afro 4302H. Honors: Women's Autobiographical Narratives. (3 cr. Prereq–Sr or grad or #)
Focus is on literary autobiography, journals, travel narratives, essays, slave narratives, testimonials, and ethnographies to consider the content and the methodological, theoretical, and aesthetic issues of the construction and production of women's experience.

Afro 4432. Colloquium: Before the Field: Internships, Community Service, and Study Abroad. (3 cr)
Theoretical and practical preparation for internships, community work, and study abroad.

Afro 4622. Caribbean Writers and Identity. (3 cr)
Examination of literary and historical issues explored by Caribbean writers in English, French, and Spanish-speaking Caribbean through autobiographies, short stories, novels, and films.

Afro 4632. Black Francophone Writers in Translation. (3 cr)
Exploration of ideas, particularly negritude and issues of creoleness, central to male and female writers in French from Africa and the Caribbean. Novels, essays, short stories, and plays.

Afro 4800. African Studies Seminar. (3 cr)
Topics vary and reflect instructor's research interests. Topics specified in *Class Schedule*.

Afro 4900. Afro-American Studies Seminar. (3 cr)
Topics specified in *Class Schedule*.

Afro 5072. Racism: Social and Psychological Consequences for Black Americans. (3 cr)
Racism and its effects on African Americans; definitions, determinants, and dynamics. Examined in an experiential context to reflect individual and institutional racism.

Afro 5143. Geography of West Africa. (3 cr)
West Africa from Senegal to Cameroon. Social geography of resource use, population, settlement, economic development, and international relations.

Afro 5145. Development in Africa. (3 cr)
Economic, political, and social development in Africa from independence to the present, emphasizing the reordering of colonial landscapes, bases for North-South relations, big power interventions, and participation in the world economy.

Afro 5181. Blacks in American Theater. (3 cr)
Historical survey of significant events in the development of American black theater traditions. Essays, plays, playwrights, and theaters from early colonial references to the Black Arts Movement.

Afro 5182. Contemporary Black Theater: 1960 to Present. (3 cr)
Essays, plays, playwrights, and theaters that have contributed significantly to contemporary black theater. From the beginning of the Black Arts movement to the present.

Afro 5191. Seminar: The African American Experience in South Africa. (3 cr. §Hist 5438)
Ideological, political, religious, and cultural ties that have informed African American and black South African relations from late 18th century to present.

Afro 5301. The African Novel. (3 cr. Prereq–Grad or #)
The novel in contemporary Africa in English, French and African languages. Non-English language works in translation.

Afro 5352. Black Families in Comparative Perspective. (3 cr)
Cross-cultural perspectives of family formation, social structure, and gender patterns of families of African descent.

Afro 5401. Field Studies in Afro-American and African Studies. (1-6 cr. Prereq–Major or minor, #)
Supervised field study/internship focused on Afro-American and/or African culture(s), language(s), and development.

Afro 5405. The African American Child. (3 cr. §3405)
Research carried out by African American psychologists and behavioral/social scientists, and by experts on African American child/youth development.

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

Afro 5593. The Afro-American Novel. (3 cr)
Contextual readings of 19th- and 20th-century black novelists including Chesnut, Hurston, Wright, Baldwin, Petry, Morrison, and Reed.

Afro 5597. Seminar: Harlem Renaissance. (3 cr)
A multidisciplinary review of the Jazz Age's Harlem Renaissance: literature, popular culture, visual arts, political journalism, and major black and white figures.

Afro 5598. Seminar: Black Arts Renaissance, 1960s and 1970s. (3 cr)
Multidisciplinary perspectives on the 1960s and 1970s Black Power "renaissance" of African American art and politics.

Afro 5655. African American Cinema. (3 cr)
Exploration of African American cinematic achievements, from the silent films of Oscar Micheaux through contemporary Hollywood and independent films, using class screenings and critical readings.

Afro 5701. Proseminar: Classic Works in Afro-American Studies. (3 cr)
Exploration of classic works in Afro-American studies; conceptual frameworks; multidisciplinary focus.

Afro 5702. Proseminar: Major Figures in Afro-American Studies. (3 cr)
In-depth examination of major figures from various fields in Afro-American studies; bio-critical focus.

Afro 5741. Minorities and the Mass Media. (3 cr; A-F only. Prereq–Jour major or minor, Jour 3004, Δ)
Analysis of relationships between mass media and communities of color in the United States. Focuses on issues of content and control.

Afro 5864. Proseminar: African-American History. (3-4 cr. Prereq–#)
Examination of issues including slavery, Reconstruction, the Great Depression, and civil rights movement using cultural and intellectual history and autobiography/biography. Focuses on dynamics of race, gender, class, region, sexuality, and religion.

Afro 5865. Proseminar: African-American History. (3-4 cr. Prereq–#)
Construction of a detailed research agenda, locating appropriate depositories of primary materials and secondary sources, and developing appropriate methodologies and frameworks.

Afro 5876. Proseminar: Approaches to African Development. (3 cr)
Study, critical analysis, and comparison of primary documents relevant to African development.

Afro 5910. Topics in Afro-American and African Studies. (3 cr [max 9 cr])
Topics specified in *Class Schedule*.

Afro 5993. Directed Study. (1-3 cr. Prereq–#)
Guided individual reading/study for qualified seniors and graduate students.

Agricultural, Food, and Environmental Education (AFEE)

Department of Work, Community, and Family Education

College of Education and Human Development

AFEE 1001. Introduction to Agricultural Education and Extension. (1 cr)
Historical development of the discipline of agricultural education; orientation to career opportunities; areas and expectations of specialization; issues in the field.

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

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

AFEE 2096. Professional Practicum in Agricultural Education: Early Experience. (1-3 cr; A-F only)
Observe schools, extension offices, and agricultural oriented businesses to learn about the work and workplaces in agricultural education.

AFEE 3096. Experiential Learning: Production and Business. (1-8 cr [max 12 cr]. Prereq–AgEd major, #)
Experiential learning in agricultural production and business. Planned, organized, monitored, and evaluated based on a per-experience diagnosis of learning prerequisite to higher level courses in technical agriculture and agricultural business.

AFEE 3112. Technical Drawing and Production Technologies. (3 cr; A-F only)
Experiences in technical drawing, design technology, and production technologies related to construction and manufacturing. Develop manipulative skills and techniques; understand principles and processes of technologies through hands-on work in a multiple activity laboratory.

AFEE 3121. Communication, Energy and Power, Transportation and Machinery Technologies. (3 cr; A-F only)
Experiences in communication, information, energy, power, and transportation technologies. Fundamentals of mechanical, fluid, and electrical power; transportation of people and materials; and technology systems for information and communication, including graphic communication and computer applications. Multiple-activity laboratory.

AFEE 4096. Practicum: Agricultural Education Technology. (1-3 cr [max 6 cr])
Individualized study packages addressing technology in agriculture production, horticulture, natural resource, biotechnology, farm and agribusiness, management, agricultural science, agriculture mechanics, youth organizations, adult and beginning farm and agribusiness management.

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

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

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

AFEE 5113. Adult Agricultural Education Program Development and Technology. (3 cr; A-F only)
Organization and implementation of education programs for farmers, farm managers, and agribusiness personnel using community and environmental resources, agricultural and instructional technology, and management information systems to attain family and business goals.

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

AFEE 5116. Coordination of SAE Programs: Work-based Learning. (2 cr; A-F only. Prereq–Agricultural education major or #)
Principles/techniques for coordinating work-based learning. Supervised agricultural experience in agricultural education. Historical/philosophical roots of experiential learning, integration with classroom instruction, legal aspects, record keeping, coordination techniques, current agreement laws.

AFEE 5118. Strategies for Managing and Advising the FFA Organization. (2 cr; A-F only. Prereq–Agricultural education major or #)
Principles/techniques to advise an FFA chapter. Historical/philosophical basis of FFA, organization/structure. Integration with classroom instruction, public relations, recruitment, and administration of FFA chapters.

AFEE 5220. Special Topics in Agriculture Education and Extension. (1-3 cr [max 12 cr])
Content varies by offering.

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

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

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

AFEE 5237. Mentorship for Supervising Agricultural Education Teachers. (2 cr)
Professional development training for experienced teachers to serve as mentors for beginning and student teachers of agricultural education. Emphasis on supervision and assessment of teaching performance. Focus on critical period of induction into the teaching profession.

AFEE 5239. Program Organization and Management in Agricultural Education. (2 cr)
Analysis of organization, management, and assessment of agricultural education programs at the middle, high school, and adult levels.

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

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

AFEE 5296. Professional Experience Practicum in Agricultural Education and Extension. (1-4 cr)
Observation, study, and experience in agricultural business and industry; identification of educational problems observed in the agricultural industry; evaluation of personal experience.

AFEE 5331. History, Philosophy, and Systems of Extension. (3 cr; A-F only)
History and philosophy of extension; modification and adaptation to worldwide methods and approved practices; extension methodologies; innovative approaches; systems appropriate to development environments.

AFEE 5341. Global Program Delivery Techniques and Technology of Extension. (2 cr; A-F only)
Educational activities, teaching, and communications methods and techniques, from outreach to extension services, with an emphasis on youth and adult education programs in different global settings.

AFEE 5351. Methods for Change in Developing Countries. (3 cr; A-F only)
Strategies and methodologies promoting change in developing countries. Examination of sociological and cultural parameters of improved practices in rural, community, and agricultural development. Project planning, implementation, and evaluation related to change in developing countries.

AFEE 5361. World Development Problems. (3 cr; A-F only)
Introduction to development problems throughout the world. Development in Third World countries. Examples of First World development problems. Interdisciplinary focus on population, health and disease, education, agriculture, industry, finance, politics, and human rights.

AFEE 5371. Farming Systems Research and Extension. (3 cr; A-F only)
Introduction to the theory and practice of linking farming systems, research, and extension. An interdisciplinary and holistic approach to rural development for individuals and communities throughout the world.

AFEE 5993. Directed Study in Agricultural Education and Extension. (1-9 cr)
Topics may be chosen to permit study of areas within education or to supplement areas of inquiry not provided in the regular course structure.

AFEE 5995. Integrating Paper—Master of Education: Agricultural and Extension Education. (1-4 cr; A-F only)
Students prepare paper dealing with issues in agricultural education applied to professional responsibilities.

Agricultural Engineering Technology (AgET)

Department of Biosystems and Agricultural Engineering

College of Agricultural, Food and Environmental Sciences

AgET 3213. Engineering Principles and Applications. (3 cr. Prereq–Math 1031 or Math 1142 or equiv, 3 cr phys or chem)
Introduces a variety of engineering principles and concepts to non-engineering students. Quantitatively apply mathematical and engineering principles to solve problems from a range of areas in animal production, crop production, horticulture, and soil and water management.

AgET 5095. Special Problems in Biosystems and Agricultural Engineering. (1-5 cr. Prereq–#)
Individual study project in biosystems and agricultural engineering at advanced level. Application of engineering principles to a specific problem.

AgET 5203. Environmental Impacts of Food Production. (3 cr)
Topics include crop production intensity, animal raising options, food processing waste alternatives, and pest control.

AgET 5212. Safety and Environmental Health Issues in Plant and Animal Production and Processing. (3 cr; A-F only. Prereq–Grad student or [jr or sr] in [COAFES or IT or education or public health or nursing])
Safety/health issues in food production, processing and horticultural work environments using public health, injury control, and health promotion frameworks: regulation, engineering, education. Traumatic injury, occupational illness, ergonomics, pesticide health effects, biotechnology, air contaminants.

AgET 5999. Special Workshop in Biosystems and Agricultural Engineering. (1-4 cr. Prereq–#)
Workshops on a variety of biosystems and agricultural engineering topics offered at locations other than the Twin Cities campus. See *Class Schedule* or department for current offerings.

Agricultural Industries and Marketing (AIM)

College of Agricultural, Food and Environmental Sciences

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

Agriculture (Agri)

College of Agricultural, Food and Environmental Sciences

Agri 1000H. Honors Colloquium. (2 cr [max 8 cr]; A-F only. Prereq–Admission to COAFES honors program or #)
Topics vary by semester.

Agri 1901. Topics: Freshman Seminar. (1-3 cr; A-F only. Prereq–Fr with no more than 36 cr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

Agri 1910W. Topics: Freshman Seminar. (1-3 cr; A-F only. Prereq–Fr with no more than 36 cr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

Agri 3000. Seminar in International Agriculture. (1-4 cr [max 8 cr]; A-F only. Prereq–#)
Oral presentations, discussion of students' research papers. Literature review of selected topics. Discussions with students/staff about their experiences in international agriculture.

Agri 3001. Pests and Crop Protection. (3 cr; A-F only. Prereq–Biol 1009 or equiv or #)
Introduction to biology/identification of insects, weeds, and diseases that affect agricultural crops. Management of these organisms based on principles of integrated pest management.

Agri 3100H. Honors Experience. (2-3 cr [max 2 cr]; A-F only. Prereq–Approved by COAFES honors program committee)
Developed by student and COAFES faculty mentor. May include foreign study-travel, research, position or policy paper, or any experience demonstrating advanced study/service/understanding.

Agri 3500. Global Seminar. (3 cr [max 9 cr]; A-F only. Prereq–#)
Interface of agriculture with various natural resource, environmental, economic, food safety, public policy, ethical issues transcending national borders. Seminars take place in other countries or regions of world, providing global perspective. Active learning, lectures, discussion tutorials, field trips, reports, exams.

Agronomy and Plant Genetics (Agro)

Department of Agronomy and Plant Genetics

College of Agricultural, Food and Environmental Sciences

Agro 1093. Directed Studies. (1-4 cr [max 12 cr]. Prereq–4 cr in agronomy, #)
Allows study of agronomy in greater depth or in areas not currently offered in formal courses. Tutorial instruction under staff guidance.

Agro 1101. Biology of Plant Food Systems. (4 cr)
Fundamental concepts of biology at the molecular, cellular, organismal, and ecosystem levels. Plants and plant use by humans. Lab, greenhouse, field, and classroom discussions.

Agro 1103. Crops, Environment, and Society. (4 cr)
Plants that supply food, fiber, beverages, and medicine to humans. Plant identification, plant physiology, plant breeding/biotechnology, plant ecology, crop culture/management.

Agro 2101. Science of Food, Land, People, and the Environment. (4 cr; A-F only)
Science base of food, land, people, and environmental systems and their interface with social, economic, and political systems. Active learning, project-based course.

Agro 2104. Grain and Seed Technology. (2 cr. Prereq–[1103, ApEc 3411] recommended)
Practice/principles of grain grading using Federal Grain Inspection Service (FGIS) standards with examples of commodity, classes, subclasses, defects, and special grades. Seed analysis identifying common crops and weed seeds. Seed laws, seed handling, conditioning/viability testing. Primarily laboratory discussion, practicum, and problem solving.

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

Agro 3203W. Environment, Global Food Production, and the Citizen. (3 cr. §AnSc 3203. Prereq–Biol 1009 or equiv)
Ecological and ethical concerns of food production systems in global agriculture—past, present, future. Examines underlying ethical positions about how agroecosystems should be configured. Decision cases, discussions, videos, other media.

Agro 4005. Applied Crop Physiology and Development. (4 cr [max 8 cr]. Prereq–[Chem 1011 or Chem 1021 or equiv], 8 cr in [biol or plant science])
Applications of plant physiology processes of water relations, photosynthesis, mineral uptake/function, transpiration, translocation, and their relationships to plant growth/development from seed germination to maturation and dry down for harvest. Emphasizes inquiry, field problems, and group activity. Lecture, laboratory.

Agro 4093. Directed Studies for Advanced Students. (1-4 cr [max 12 cr]. Prereq–15 cr in agronomy, #)
Allows study of agronomy in greater depth or in areas not currently offered in formal courses. Tutorial instruction under staff guidance.

Agro 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; S-N only. Prereq–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering)
Supervised professional experience in agribusiness firms or government agencies; evaluative reports and consultations with faculty advisers and employers.

Agro 4101. Agricultural Decision Making and Experimentation. (3 cr. Prereq–Jr or sr)
Principles of field plot techniques and design applied to field demonstrations/experiments. Inductive/deductive reasoning, analysis of data, tests of significance. Treatment comparisons, decision making. Computers used for data processing and statistical analysis.

Agro 4103. World Food Problems. (3 cr. §ApEC 4103, §CAPS 4103, §FScN 4103. Prereq–Jr or sr or grad)
Multidisciplinary look at problems of and possible solutions for food production, storage, and utilization in developing countries. Presentations and discussions introduce conflicting views on population, use of technology, and ethical and cultural values held in various parts of the world.

Agro 4201. Agro-ecosystems and Crop Production. (3 cr. Prereq–10 cr of biol and/or plant science)
Basic concepts in agrosystems: organization, development, and function of field crop communities in contrast to natural ecosystems. Means of improving designed and managed systems for the benefit of humankind while minimizing impact on the ecosystem.

Agro 4401. Plant Genetics and Breeding. (4 cr. §Hort 4401. Prereq–[Biol 1009 or equiv], grad student with program committee approval, #)
Principles of plant genetics and environmental variation. Applications of genetics to crop evolution and breeding of self-pollinated, cross-pollinated, and asexually propagated crops. Lab experiments in hybridization, variation, and selection.

Agro 4505. Biology, Ecology, and Management of Invasive Plants. (3 cr. Prereq–4005, [Bio 3002 or equiv], Soil 2125, [Agro 2501 or Hort 1011])
Ecology/biology of invasive plant species (weeds). Principles of invasive plant management in agricultural/horticultural, urban, wetland, aquatic, and other non-cropland landscape systems, utilizing biological, cultural, and chemical means. Management strategies to design systems that optimize invasive plant management in terms of economic, environmental, and social impacts.

Agro 4603. Field Crop Scouting and Problem Diagnosis. (3 cr. Prereq–3005, Soil 3416, [[2501, Ent 3001, PlPa 2002] or Agri 3001], [jr or sr], 16-20 cr in major)
Insects, diseases, weeds. Nutrient status. Environmental stresses due to wind, hail, frost, soil conditions, and chemical injury. Calibration of equipment associated with crop protection. Pesticide use, safety procedures. Crop growth staging and growing degree day as components of decision-making and precision agriculture. Intensive summer training sessions at selected Minnesota agricultural research and outreach centers.

Agro 4605. Management Strategies for Crop Production. (4 cr. Prereq–Jr or sr or grad student with program committee approval)
Crop management situations/needs in various climate zones, soil types, from seed selection to crop storage. Focuses on cropping systems involving corn, soybeans, small grains, and forages. Emphasizes long term productivity, profitability, and sustainability. Lecture, discussion, problem sets, laboratory.

Agro 4660. Senior Capstone: Leadership, Decision Making, and Problem Solving. (2 cr. Prereq–4096 or ScAg 4009 or #)
Professional leadership and decision making from ethical, technical, societal, and personal reflection perspectives. Linked to undergraduate internship and other experiential learning opportunities. Problems, decision-centered cases, interviews.

Agro 4888. Issues in Sustainable Agriculture. (2 cr. Prereq–[1103, Soil 1125] or 2125 or equiv)
Agroecology, sustainable practices, production economics, environmental quality, holistic resource management, healthy food/water, rural communities. Meet sustainable-agriculture advocates, including farmers, faculty, and representatives of non-profit sustainable-agriculture organizations.

Agro 5021. Introduction to Plant Breeding. (3 cr. Prereq–[GCB 3022 or equiv], background in plant science)
For majors not specializing in plant breeding. How genetics is applied to plant improvement. Emphasizes sustainable-production scenarios.

Agro 5311. Research Methods in Crop Improvement and Production. (1 cr; S-N only. Prereq–Applied Plant Sciences grad)
Demonstrations and discussions of techniques in crop improvement and/or production research. Presentations integrate biotechnology with traditional breeding methods; production sessions emphasize ecologically sound cropping systems.

Agro 5321. Ecology of Agricultural Systems. (3 cr; A-F only. §Ent 5321. Prereq–[3xxx or above] course in [Agro or AnSc or Ent or Hort or PlPa or Soil] or #)
Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied.

Agro 5999. Special Topics/Workshop in Agronomy. (1-4 cr. Prereq–Jr or sr)
Workshops on a variety of topics in Agro offered at locations other than the Twin Cities campus. Presenters/faculty may include guest lecturers/experts. Topics specified in *Class Schedule*.

Akkadian (Akka)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Akka 5011. Elementary Akkadian I. (3 cr. Prereq–Adv undergrads with # or grads)
Introduction to cuneiform script. Basics of Old Babylonian morphology and syntax. Written drills, readings from Hammurabi laws, foundation inscriptions, annals, religious and epic literature.

Akka 5012. Elementary Akkadian II. (3 cr. Prereq–5011)
Continuation of 5011. Readings include The Gilgamesh Epic, The Descent of Ishtar, Mari Letters, Annals of Sennacherib and Essarhaddon, Sargon II.

Akka 5300. Readings in Akkadian. (3 cr [max 18 cr]. Prereq–5011, 5022)
Survey of Akkadian literature, including literary, legal, historiographical, and sacred texts. Topics specified in *Class Schedule*.

American Indian Studies (AmIn)

Department of American Indian Studies

College of Liberal Arts

AmIn 1001. Indigenous Peoples: an American Perspective. (3 cr)
Introduction to how voices/visions of indigenous peoples have contributed to history of cultural expression in North America. Historic contexts/varieties of this expression by region, tribal cultures. Emphasizes contributions in literature, philosophy, politics, fine arts.

AmIn 1002. Indigenous Peoples: A Global Perspective. (3 cr; A-F only. §Pol 1019)
Colonial experiences of selected indigenous peoples in Americas, Euroasia, Pacific Rim.

AmIn 1101. Beginning Ojibwe I. (5 cr)
Acquisition of speaking skills, fundamentals of grammar, writing systems.

AmIn 1102. Beginning Ojibwe II. (5 cr. Prereq–1101)
Acquisition of speaking skills, fundamentals of grammar, and writing systems.

AmIn 1121. Beginning Dakota I. (5 cr)
Development of the four skills of language acquisition: listening, speaking, reading, and writing. Oral drills and in-class participation focused on questions and answers.

AmIn 1122. Beginning Dakota II. (5 cr. Prereq–1121)
Further development of language acquisition skills with oral drills and in-class participation focused on questions and answers.

AmIn 1908W. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

AmIn 3103. Intermediate Ojibwe I. (5 cr. Prereq–1101, 1102)
Improving speaking skills; grammatical structures; storytelling, oral history, and translation projects.

AmIn 3104. Intermediate Ojibwe II. (5 cr. Prereq–1101, 1102, 3103)
Improving speaking skills; grammatical structure; storytelling, oral history, and translation projects.

AmIn 3123. Intermediate Dakota I. (5 cr. Prereq–1122)
Development of listening, speaking, reading, and writing skills with oral drills and in class participation focused on questions and answers.

AmIn 3124. Intermediate Dakota II. (5 cr. Prereq–1121, 1122, 3123)
Further development of the listening, speaking, reading, and writing skills with oral drills and in class participation focused on questions and answers.

AmIn 3201W. American Indian Literature. (3 cr)
Comparative studies of oral traditions, modern literature from various tribal cultures.

AmIn 3301. American Indian Philosophies. (4 cr)
World views of the indigenous people of the Americas. Topics include native medicines and healing practices, ceremonies and ritual, governance, ecology, humor, tribal histories, and status of contemporary native people.

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

AmIn 3401. American Indian Art. (4 cr)
Visual arts depicting rituals, traditions, values, and worldviews of major American Indian populations. Creative processes of art from pre-contact times through contemporary art. Emphasis placed on style, technique, materials and imagery, and symbolism.

AmIn 3409. American Indian Women: Ethnographic and Ethnohistorical Perspectives. (3 cr)
Comparative survey of ethnographic/ethnohistorical writings by/about American Indian women.

AmIn 3501. American Indian Tribal Governments and Politics. (3 cr; A-F only. §Pol 3701)
History, development, structure, politics of American Indian Governments. North American indigenous societies from pre-colonial times to present. Evolution of aboriginal governments confronted/affected by colonizing forces of European/Euro-American states. Bearing of dual citizenship on nature/powers of tribal governments in relation to states, federal government.

AmIn 3701. Ojibwe Culture and History. (3 cr)
Ojibwe culture, history, and traditions including philosophy, religion, and lifestyle. Students develop an appreciation for the values and belief systems of traditional Indian people.

AmIn 3711. Dakota Culture and History. (3 cr)
An overview of Dakota culture, language, history, literature, contemporary issues, and the arts.

AmIn 3713. American Indian Communities of the Great Lakes. (3 cr)
American Indian communities of the Great Lakes over time, with particular attention to Ojibwe, Dakota, and HoChunk experiences. How the richness of the world created by Great Lakes tribes was damaged, depressed, and altered but not destroyed by the arrival of Euramericans.

AmIn 3870. Topics in American Indian History. (3 cr)
Topics may include social history, oral history, history of particular regions, political systems, education, and policy. Designed for undergraduates.

AmIn 3871. American Indian History: Precontact to 1830. (4 cr)
American Indian history from the era of ancient Native America to the removal era. Social, cultural, political, and economic diversity of Native American peoples and Native American experiences with European colonialism.

AmIn 3872. American Indian History: 1830 to the Present. (4 cr)
American Indian history from 1830 to the present. Impact of federal Indian policy on American Indian cultures and societies.

AmIn 3876. American Indian Education. (3 cr)
Educational processes in American Indian cultures; history of school programs established for tribes by missionaries and the U.S. and Canadian governments; the importance of boarding schools in shaping the lives, families, communities, and educational expectations of Indian people in the late-19th and early-20th centuries.

AmIn 4201. Topics in American Indian Literature. (3 cr)
Topics organized around issues of theme or genre or region or tribe or gender.

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

AmIn 4402. American Indians and the Cinema. (4 cr)
The effect of Hollywood cinema on the American Indian image. Lecture, discussion, slides of artistic portrayals of American Indians, film clips, and full-length movies.

AmIn 4501. Law, Sovereignty, and Treaty Rights. (3 cr. Prereq–1001)
History of American Indian law and the post-contact effects of colonial and U.S. law on American Indians through the 20th century.

AmIn 4511. American Indian Political Economy. (3 cr. Prereq–1001)
Sources, nature, consequences of social/economic development/change in Indian communities. Precontact Indian communities. Effect of European contact. Social movements into 20th century, including phenomenon of urban Indian communities.

AmIn 4515. Contemporary American Indian Movements. (3 cr. Prereq–1001)
American Indian organizations and social movements of the 20th century. Explorations of political activism on and off reservations; treaty disputes; economic development strategies; the revival of traditional beliefs.

AmIn 4525. Federal Indian Policy. (3 cr)
Formulation, implementation, evolution, comparison of Indian policy from pre-colonial times to self-governance new millennium. Theoretical approaches to federal Indian policy. Major federal Indian policies. Views/attitudes of policy-makers, reactions of indigenous nations to policies. Effect of bodies of literature related to policies.

AmIn 4990. Topics in American Indian Studies. (1-4 cr [max 8 cr])
Topics specified in *Class Schedule.*

AmIn 4991. Independent Study. (1-12 cr [max 18 cr]. Prereq–#, Δ, ❑)

AmIn 4994. Directed Research. (1-12 cr [max 18 cr]. Prereq–#, Δ, ❑)
Individually arranged research with faculty to meet student needs and interests.

AmIn 4996. Field Study. (1-12 cr [max 18 cr]. Prereq–#, Δ, ❑)
Opportunities for experiential learning in a variety of American Indian community settings. Consult department faculty at least one term before enrolling.

AmIn 5890. Problems in American Indian History. (3 cr. Prereq–#)
Intensive consideration of topics in American Indian history. Possible topics include social history, Indian history of particular regions, political systems, education, and American Indian policy.

AmIn 5920. Topics in American Indian Studies. (2-4 cr [max 4 cr]. A-F only)
Intensive examination of a particular topic (e.g., American Indian education, American Indians of the Great Lakes, American Indians of the Southwest, American Indians and the Federal government).

American Sign Language (ASL)

Department of Educational Psychology

College of Education and Human Development

ASL 1701. American Sign Language I. (4 cr)
Introduction to learning and understanding American Sign Language (ASL); cultural values and rules of behavior of the deaf community in the United States. Includes receptive and expressive readiness activities; sign vocabulary; grammatical structure; receptive and expressive fingerspelling; and deaf culture.

ASL 1702. American Sign Language II. (4 cr. Prereq–1701 or #)
Increased communication skill in American Sign Language (ASL); cultural values and behavioral rules of the deaf community in the U.S.; receptive and expressive activities; sign vocabulary; grammatical structure; receptive and expressive fingerspelling and aspects of deaf culture.

ASL 3703. American Sign Language III. (4 cr. Prereq–1702 or #)
Expanded instruction of American Sign Language (ASL). Receptive and expressive activities; sign vocabulary; grammatical structure; receptive and expressive fingerspelling; narrative skills; cultural behaviors; and aspects of deaf culture. Abstract and conversational approach.

ASL 3704. American Sign Language IV. (4 cr. Prereq–3703 or #)
Increases the emphasis on more abstract and challenging conversational and narrative range. Includes receptive and expressive readiness activities; sign vocabulary; grammatical structure; receptive and expressive fingerspelling; various aspects of deaf culture and cultural behavior rules.

ASL 3705. Cultural Perspectives of Deafness. (2 cr)
Introduction to the deaf community as a linguistic and cultural minority group. Role of deaf people in the larger society; political activism; laws; access to information; educational philosophies and methods; and communication systems.

ASL 5642. Classroom Communication Through ASL. (1-2 cr [max 5 cr]; S-N only. Prereq–Fluency in ASL, #)
American Sign Language (ASL) form/function, vocabulary production, grammatical features needed by professionals working with children, storytelling strategies, technical sign language for classroom teachers. Content progresses in repeated segments.

American Studies (AmSt)

Department of American Studies

College of Liberal Arts

AmSt 1001. American Popular Arts and Public Life, 1900-1940. (4 cr)
Interdisciplinary study of American society from precontact to industrialization. American literature, art, music, and popular culture in historical context.

AmSt 1001H. Honors: American Popular Arts and Public Life, 1900-1940. (4 cr. §1001W. Prereq–Honors)
Interdisciplinary study of American society from precontact to industrialization. American literature, art, music, and popular culture in historical context.

AmSt 1002. American Popular Arts and Public Life, 1940 to present. (4 cr)
Interdisciplinary study of American society from industrialization through the present. Examination of American literature, art, music, and popular culture in historical context.

AmSt 1112. American Cultures II, Transition. (3 cr; A-F only)
Interdisciplinary study of diversity of American cultures, 1890-1945. Urban life/leisure, changing family/gender roles, race/national identity.

AmSt 1113. American Cultures III, Transition. (3 cr; A-F only)
Interdisciplinary study of diversity of American cultures, 1945-present. Family practices/gender roles. Social change movements (civil rights, American Indian, women's). Politics of popular culture (music, television, fashion, art).

AmSt 1201. Learning Public Ethics Through Arts and the University. (3 cr; A-F only)
Residential College course on study of public ethical decision-making. Case studies of University institutions, literature, and arts, looking at University/public interaction and arts representations to learn ways ethics works in people's participation in public life.

AmSt 1907W. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

AmSt 1908W. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule*.

AmSt 1909W. Topics: Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule*.

AmSt 3001. Introduction to Asian American Studies. (3 cr)
History, cultural productions, and contemporary concerns of Americans of Chinese, Japanese, Korean, South Asian, Filipino, and Southeast Asian ancestry. Asian American communities looked at from various scholarly perspectives.

AmSt 3111. American Cultures and the Arts. (3 cr)
Relationships between American cultures and artistic production through study of the works and lives of selected artists. How American societies and cultures shape, and are shaped by, artistic forms and expressions.

AmSt 3113W. America's Diverse Cultures. (3 cr)
Diverse cultural (racial, ethnic, class) groups in America. Institutions/processes that shape their relations and create domination, resistance, hybridity, nationalism, racism, alliance. Specific content may vary.

AmSt 3114. America in International Perspective. (3 cr)
The nature of international cultural exchange. The impact of U.S. cultures and society on other countries of the world as well as the impact of other cultures and societies on the United States.

AmSt 3252W. American Popular Culture and Politics: 1900 to 1945. (4 cr)
Historical analysis of how popular arts represent issues of gender, race, consumerism, and citizenship. How popular artists define the boundaries of citizenship and public life: inclusions and exclusions in polity and national identity. How popular arts reinforce or alter political ideologies.

AmSt 3253W. American Popular Culture and Politics: 1945 to the Present. (4 cr)
Historical analysis of how popular arts represent issues of gender, race, consumerism, and citizenship. How popular artists define the boundaries of citizenship and public life: inclusions and exclusions in polity and national identity. How popular arts reinforce or alter political ideologies.

AmSt 3299W. Junior Proseminar. (3 cr; A-F only)
Exploration of classic and contemporary works and problems; methods and problems in the field; the development of American Studies and the idealizing of an American past; the challenges of multiculturalism and contemporary themes in the field.

AmSt 3301W. Senior Proseminar in American Studies. (3 cr. Prereq–AmSt sr)
Each semester covers a problem related to a representative theme, figure, or period. Students research and write senior theses.

AmSt 3302W. Senior Proseminar in American Studies. (3 cr. Prereq–AmSt sr)
Each semester covers a problem related to a representative theme, figure, or period. Students research and write senior theses.

AmSt 3920. Topics in American Studies. (3 cr. Prereq–Jr or sr)
Topics specified in *Class Schedule*.

AmSt 3993. Directed Studies. (1-9 cr [max 9 cr]. Prereq–#)
Guided individual reading or study.

AmSt 4101. Gender, Sexuality, and Politics in America. (3 cr; A-F only)
Ways public and private life intersect through the issues of gender, sexuality, family, politics, and public life; ways in which racial, ethnic, and class divisions have been manifest in the political ideologies affecting private life.

AmSt 5101. Religion and American Culture. (3 cr; A-F only)
Role of religion in shaping contemporary American cultural pluralism. Institutions and processes, intellectual frameworks, aesthetic and symbol systems that form religious communities and contribute to religious conflicts in U.S. society and culture.

AmSt 5202. Thought and Practice of American Religions. (4 cr. Prereq–#)
Holidays, festivals, religious arts, organizations, spirituality, ethics, and systems of thought of "civil religion," "women's religion," indigenous American religions, American versions of Christianity, Judaism, Islam, Buddhism, and other world faiths, and their interactions in the United States and worldwide.

AmSt 5920. Topics in American Studies. (3-4 cr [max 9 cr])
Topics specified in *Class Schedule*.

Ancient Near Eastern (ANE)

Department of Classical and Near Eastern Studies

College of Liberal Arts

ANE 1001. The Bible: Narrative Texts. (3 cr. Prereq–Knowledge of Hebrew not required)
Survey of literary and historical narrative texts from: Pentateuch, Joshua, Judges, Samuel, Kings, and Ruth. Study of the art of biblical narrative and major themes of biblical stories. Comparison with other Ancient Near Eastern literatures. Literary conventions of biblical writers.

ANE 1002. The Bible: Prophecy. (3 cr. Prereq–Knowledge of Hebrew not required)
Survey of Israelite prophets, with emphasis on Amos, Hosea, Isaiah, Jeremiah, Ezekiel, and Second Isaiah. Prophetic contributions to Israelite religion. Personality of prophets. Politics and prophetic reaction. Textual analysis and biblical scholarship. Prophecy viewed cross-culturally.

ANE 1003. The Bible: Wisdom, Poetry, and Apocalyptic. (3 cr. Prereq–Knowledge of Hebrew not required)
Survey of books of Psalms, Proverbs, Job, Song of Songs, Lamentations, Ecclesiastes (Qoheleth). Characteristics of biblical poetry. Conceptions of Israelite wisdom writing. Traits of early Jewish apocalyptic writing.

ANE 3001. The Bible: Narrative Texts. (3 cr)
Survey in English of literary/historical narrative texts from Pentateuch, Joshua, Judges, Samuel, Kings, and Ruth. Art of biblical narrative. Major themes of biblical stories. Comparison with other Ancient Near Eastern literatures. Literary conventions of biblical writers.

ANE 3002. The Bible: Prophecy. (3 cr)
Survey of Israelite prophets, with emphasis on Amos, Hosea, Isaiah, Jeremiah, Ezekiel, and Second Isaiah. Prophetic contributions to Israelite religion. Personality of prophets. Politics and prophetic reaction. Textual analysis and biblical scholarship. Prophecy viewed cross-culturally.

ANE 3003. The Bible: Wisdom, Poetry, and Apocalyptic. (3 cr. Prereq–Knowledge of Hebrew not required)
Survey of books of Psalms, Proverbs, Job, Song of Songs, Lamentations, Ecclesiastes (Qoheleth). Characteristics of biblical poetry. Conceptions of Israelite wisdom writing. Traits of early Jewish apocalyptic writing.

ANE 3251. Modern Study of the Old Testament. (3 cr. Prereq–Knowledge of Hebrew not required)
Methods used in studying the Old Testament, including textual criticism, the anthropological approach, the sociological approach, the history of religion, and the use of archeology in interpreting the text.

ANE 3501. Ancient Israel: The Origins of Israel in Biblical Traditions. (3 cr. Prereq–Knowledge of Hebrew not required)
Foundation of the Hebrew people. Traditions of patriarchal period, development of Israelite religious/legal institutions. Ancient Near Eastern context of Israel's origins. Period of 2nd millennium B.C.

ANE 3502. Ancient Israel: From Conquest to Exile. (3 cr. Prereq–Hebrew not required; 3501 recommended)
Israelite history in context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focus on issues raised by archaeological data related to Israelite conquest of Canaan.

ANE 3503. History and Development of Israelite Religion I. (3 cr. Prereq–No knowledge of Hebrew required)
Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

ANE 3504. History and Development of Israelite Religion II. (3 cr)
Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, and Roman.

ANE 3951. Major Project. (4 cr. Prereq–ANE major, 3 3xxx ANE courses or #)
Research project pertaining to the study of the ancient world, using documents or other primary sources along with secondary sources. Students select project in consultation with a faculty member.

ANE 4051. Ancient Near East and Egypt: Neolithic to 1500 BCE. (3 cr; A-F only. §Hist 5041. Prereq–Prev coursework in ancient history recommended)
Lands of Western Asia and Northeast Africa from Neolithic through Middle Bronze Age. Interdependent technological/political developments such as agriculture, state formation, and writing. Use of literature/art as vehicles for articulating concepts. Changing relationships among cultures/polities of ancient Near East and regions beyond.

ANE 4052. Ancient Near East and Egypt: 1500 to 323 BCE. (3 cr; A-F only. §Hist 4052. Prereq–4051 or prev coursework in ancient history recommended)
Lands of Western Asia and Northeast Africa from Late Bronze Age to death of Alexander in 323 BCE. Growth/decline of empires. Diplomatic relations and sociopolitical transformations among Late Bronze and Iron Age states. New military technologies. Developments in religion/theology.

ANE 5501. Ancient Israel: The Origins of Israel in Biblical Traditions. (3 cr. Prereq–Knowledge of Hebrew not required)
The foundation of the Hebrew people; traditions of the patriarchal period, development of Israelite religious and legal institutions; Ancient Near Eastern context of Israel's origins.

ANE 5502. Ancient Israel: From Conquest to Exile. (3 cr. §3502, §RelA 3502, §RelA5502. Prereq–Hebrew not required; 5501 recommended)
Israelite history in context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focus on issues raised by archaeological data related to Israelite conquest of Canaan.

ANE 5503. History and Development of Israelite Religion I. (3 cr)
Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion, and historiography. Relationship to surrounding religious systems. Knowledge of Hebrew not required.

ANE 5504. History and Development of Israelite Religion II. (3 cr)
Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, and Roman.

ANE 5701. Studies in Semitic Linguistics and Inscriptions. (3 cr. Prereq–Adv Hebrew or Adv Arabic or #)
Survey of comparative Semitic linguistics with emphasis on Northwest Semitic. Reading of Phoenician, Moabite, and Judean inscriptions.

ANE 5713. Introduction to Ugaritic. (3 cr. Prereq–Adv Hebrew, previous study of biblical texts or #)
Ugaritic alphabetic cuneiform script, morphology, and syntax. Reading of representative samples of Ugaritic literature. Attention to linguistic and cultural issues and links to biblical and other Ancient Near Eastern texts.

ANE 5993. Directed Studies. (1-4 cr. Prereq–#, Δ, ❑)
Guided individual reading or study.

Animal Science (AnSc)

Department of Animal Science

College of Agricultural, Food and Environmental Sciences

AnSc 1011. Domestic Animals and Society. (3 cr)
Controversial issues in animal agriculture including animal products in the human diet; livestock and human competition for limited resources; animal behavior, welfare, and rights; organic vs. conventionally-produced food; livestock integration into sustainable resource utilization.

AnSc 1021. Avian Sampler. (1 cr)
Topics vary, see *Class Schedule* or contact the department.

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

AnSc 1403. Companion Animal Nutrition and Care. (2 cr)
For those without animal or nutrition training who have an interest in animal care. Nutrition of healthy animals and factors including behavior, environmental conditions, food type and availability. Focus on companion animals.

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

AnSc 2011. Dairy Cattle Judging. (2 cr. Prereq–#)
Evaluation of dairy animals on the basis of physical appearance, including classes of heifers and cows from the six major dairy breeds. Held in conjunction with the Minnesota State Fair. Training in oral reasons.

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

AnSc 2013. Beginning Livestock Judging. (2 cr. Prereq–Soph or jr or sr, ¶2012 recommended or #)
Visual evaluation of beef cattle, swine, and sheep for type, muscling, degree of finish, structure, and soundness. Short oral presentations. Preparation for collegiate livestock judging competition.

AnSc 2102. Horse Production. (3 cr)
Fundamentals of horse care. Equine nutrition, behavior, diseases. Hoof care. First aid, health care, disease prevention. Parasites.

AnSc 2211. Biometrics for Livestock. (3 cr. §Stat 3011, §Agro 4104, §5021. Prereq–Math 1031 or higher)
Descriptive statistics. Elementary probability. Correlation. Regression. ANOVA. Statistics as applied to livestock.

AnSc 2301. Systemic Physiology. (4 cr. Prereq–Biol 1009 or equiv)
Introduction to physiology of the neural, circulatory, respiratory, immune, and digestive systems of domestic animals.

AnSc 2401. Animal Nutrition. (3 cr. Prereq–BioC 1012 or Chem 2301)
Classification and function of nutrients; use of nutrients for body maintenance, growth, egg production, gestation, and lactation; comparative study of the digestive systems of farm animal species.

AnSc 3102. Equine Management. (3 cr. Prereq–2102)
Fundamentals of horse management. Record keeping (traditional, computer based). Marketing, sales techniques. Legal aspects (e.g., contracts, zoning, liability, insurance). A management project involves establishing, maintaining, improving an equine business.

AnSc 3141. Advanced Dairy Judging. (1 cr. Prereq–2011 or #)
Training in presentation of oral reasons in dairy cattle judging. Selected students from this course participate in fall intercollegiate dairy judging contest.

AnSc 3142. Advanced Livestock Judging. (2 cr. Prereq–2013 or #)
Visual evaluation of beef cattle, swine, and sheep for muscling, finish, structure, and soundness. Use of production (growth and reproduction) records in evaluation. Oral presentations. Preparation for national collegiate livestock judging contest.

AnSc 3143. Meat Judging and Grading. (2 cr. Prereq–1511, #)
In-depth training in beef, pork, and lamb judging, writing reasons, and beef carcass grading and specifications. Field trips to packing plants. Students selected from course participate in intercollegiate meats judging contests.

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

AnSc 3221. Animal Breeding. (4 cr)
Application of qualitative and quantitative genetics to animal breeding. Concepts of livestock improvement through selection and mating programs.

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

AnSc 3307. Artificial Insemination Techniques. (1 cr; S-N only. Prereq–3305 recommended, #)
Hands-on training and techniques of artificial insemination at an off-campus laboratory setting. Proper techniques of AI and semen handling, and criteria for selection of bulls.

AnSc 3511. Animal Growth and Development. (3 cr)
Basic principles of animal growth. Critical evaluation of interaction of nutrition, hormones, exercise, heredity, and disease in regulating growth.

AnSc 4011. Dairy Cattle Breeding. (3 cr. Prereq–3221)
Applying quantitative genetic principles to the breeding of dairy cattle. Primary emphasis on the evaluation of males, females, and systems of mating. Rates of genetic improvement with and without AI.

AnSc 4092. Special Problems in Animal Science. (1-4 cr. Prereq–#)
Research in an area of animal science under the supervision of a faculty member. Written report on the research is required.

AnSc 4093. Tutorial in Animal Science. (1-4 cr. Prereq–#)
Informally structured to encourage in-depth study of specific disciplines in animal science. Pertinent readings; preparation of written essays of high quality required.

AnSc 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; S-N only. Prereq–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering)
Supervised professional experience in animal industries and farm enterprise systems with study of various aspects of the industry and related fields; evaluative reports and consultations with faculty advisers and employers.

AnSc 4099. Special Workshop in Animal Science. (1-4 cr)
Workshops on a variety of topics in animal science. Consult *Class Schedule* or department for offerings. Topics may use guest lecturers/experts.

AnSc 4401. Swine Nutrition. (3 cr. Prereq–2401, 3511 recommended)
A comprehensive review of major considerations in providing optimum, cost-effective nutrition to swine in all stages of production.

AnSc 4403. Ruminant Nutrition. (4 cr. Prereq–2401)
Nutrient requirements of ruminants, physiology of digestion in ruminants, nutrient content of feedstuffs, primarily forages; energy utilization, protein and nonprotein nitrogen utilization; nutritional disorders; formulation of adequate rations.

AnSc 4405. Poultry Nutrition. (3 cr. Prereq–2401)
Nutrient requirements of chickens and turkeys; feed composition and use in formulation of adequate diets. Role of feed additives. Least cost formulations, nutritional interrelationships, and feeding systems.

AnSc 4501. Principles of Farm Animal Environment. (3 cr. Prereq–2301, jr or #)
Biological and physical processes involved in the adjustment of animals to ambient environments and their applications to farm animal management.

AnSc 4601. Pork Production Systems Management. (4 cr. Prereq–3221, 3305, 4401; 4501 recommended)
Focus on understanding the inter-relationships of business, marketing, and biological performance of pigs in various types of production systems.

AnSc 4602. Sheep Production Systems Management. (4 cr. Prereq–2401; 3221 recommended)
Sheep management using feeding, breeding, selection, health, and physiological management aids for breeding flock and market lamb production. Taught via ITV with Crookston campus and the West Central Experiment Station, Morris.

AnSc 4603. Beef Production Systems Management. (4 cr. Prereq–4403 recommended)
Status and characteristics of the beef industry; apply principles of animal breeding, nutrition, physiology, and economics to management of beef cattle breeding herds and cattle feeding operations. Ration formulation, management, and marketing of feedlot cattle.

AnSc 4604. Dairy Production Systems Management. (4 cr. Prereq–2401; 3221, 3305, 4403 recommended)
Practical applications of principles of animal breeding, nutrition, physiology, reproduction, housing, and economics in a problem solving context. Active learning with decision-case discussion, farm visits, and field diagnostic techniques laboratories.

AnSc 4605. Poultry Production Systems Management. (4 cr. Prereq–2401; 4405 recommended)
Physiology, genetics, diseases, nutrition of poultry and relation to current management practices for production of eggs, broilers, and turkeys. Technical and practical phases of production and marketing in relation to their underlying principles. Visits to commercial production units.

AnSc 4609. Analysis of Livestock Production Systems. (2 cr)
Systems approach to decision making and problem solving in production enterprises. Planning, long range goal setting, production analysis, risk analysis, and cost-benefit analysis are examined in the total system including quality of life issues.

AnSc 4611. Advanced Pork Production Systems Management. (2 cr. Prereq–¶4609; 4601)
Analysis of pork production systems using case studies and visits to modern pork production operations.

AnSc 4613. Advanced Beef Production Systems Management. (2 cr. Prereq–¶4609; 4603)
Analysis of beef production systems using case studies and visits to beef cow-calf operations and feedlots.

AnSc 4614. Advanced Dairy Production Systems Management. (2 cr. Prereq–¶4609, 4604)
Analysis of dairy production systems using case studies and visits to actual dairies.

AnSc 5099. Special Workshop in Animal Science. (1-6 cr [max 12 cr]; A-F only. Prereq–#)
Topics vary. See *Class Schedule* or department. Topics may use guest lectures/experts.

AnSc 5200. Statistical Genetics and Genomics. (4 cr. Prereq–[Stat 3021 or equiv], [Biol 4003 or equiv])
Linkage analysis for pedigree data with codominant/dominant markers, using allele transmission, maximum likelihood, and disequilibrium. Analysis for radiation hybrid mapping. Parentage testing, marker polymorphism. Experimental design and statistical analysis for mapping quantitative trait loci with additive, dominance, and epistasis effects. Candidate gene approach and genome scan. Marker assisted selection, gene introgression.

Anthropology (Anth)

Department of Anthropology

College of Liberal Arts

Anth 1001. Human Evolution. (4 cr)
From ancestors of chimpanzees and humans to origins of modern humans. Principles of evolutionary theory, behavioral biology, and comparative anatomy used to reconstruct the major events in human evolution and the behavior of ourselves and our ancestors.

Anth 1001H. Honors: Human Evolution. (4 cr. §1001. Prereq–Honors)
From ancestors of chimpanzees/humans to origins of modern humans. Principles of evolutionary theory, behavioral biology, comparative anatomy used to reconstruct the major events in human evolution, behavior of ourselves/our ancestors.

Anth 1003V. Understanding Cultures: Honors. (4 cr. Prereq–Honors)
Introduction to social/cultural anthropology. Comparative study of societies/cultures around world. Adaptive strategies. Economic processes. Kinship, marriage, gender. Social stratification. Politics/conflicts. Religion/ritual. Personality/culture.

Anth 1003W. Understanding Cultures. (4 cr)
Introduction to social and cultural anthropology. Comparative study of societies and cultures around the world. Topics include adaptive strategies; economic processes; kinship, marriage, and gender; social stratification; politics and conflicts; religion and ritual; personality and culture.

Anth 1005V. Introduction to Cultural Diversity and the World System. (4 cr; A-F only)
Anthropology of cultural diversity in the United States and around the world. Comparative study of relationship between local cultures, global processes. Race/ethnicity, economic/social organization, political/religious systems, gender, social change.

Anth 1005W. Introduction to Cultural Diversity and the World System. (4 cr)
Anthropology of cultural diversity, in the United States and around the world. Comparative study of relationship between local cultures and global processes. Race/ethnicity, economic/social organization, political/religious systems, gender, social change.

Anth 1111. Human Origins. (3 cr; A-F only)
World prehistory as investigated by anthropologists. Methods/concepts used to study prehistoric human biological/cultural development.

Anth 1902–1905. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule.*

Anth 1907W–1910W. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule.*

Anth 3001. Introduction to Archaeology. (4 cr)
The fundamentals of fieldwork, laboratory analysis, and interpretation in archaeology. How field and laboratory research are designed and implemented, and how results are interpreted.

Anth 3003. Cultural Anthropology. (3 cr. Prereq–1003 or #)
Areas of study may include field research and the politics of ethnographic knowledge; Marxist and feminist theories of culture; culture, language and discourse; psychological anthropology; culture and transnational processes.

Anth 3005. Language and Sociocultural Analysis. (4 cr. Prereq–[1003, anthropology major] or #)
Studying sociocultural forms by analyzing linguistic data obtained in fieldwork setting. Students work with fluent speaker of non-English language to explore an unfamiliar culture in manner of an ethnographer working with a key informant.

Anth 3007. Laboratory Techniques in Archaeology. (3 cr. Prereq–1001, 3001)
Focuses on plant remains, material culture, faunal remains, and human osteology. Emphasis on lab experience.

Anth 3009. Rise of Civilization. (3 cr)
Concept of civilization, from early hunter gatherer groups through settled agricultural villages to rise of towns/cities. Compares processes of change in eight regions of the world.

Anth 3010. Native North Americans in Regional Perspective. (3-6 cr [max 6 cr])
An in-depth cultural and historical survey of native peoples who inhabit a particular region of North American (e.g., the greater southwest, prairie/woodland transition zone, Great Lakes area, Northwest coast, etc.).

Anth 3013. American Indian Languages and Cultures. (3 cr)
Survey of cultural developments among native peoples of North American from historic times to present.

Anth 3017. Peoples and Cultures of Middle America. (3 cr)
Indian and Mestizo (Hispanic) cultures of Mexico and Guatemala and parts of Belize, Honduras, and Nicaragua. Describes both pre-Hispanic and Hispanic influences, with attention to area-wide patterns and local traditions.

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

Anth 3023. Culture and Society of India. (3 cr)
Contemporary society and culture in South Asia from an anthropological perspective with reference to nationalism; postcolonial identities; media and public culture; gender, kinship and politics; religion; ethnicity; and the Indian diaspora.

Anth 3025. Pacific Island Societies. (3 cr. Prereq–1003 or 3003 or #)
Geography, prehistory, and Western exploration of Pacific Islands from Hawaii to Papua New Guinea. Culture change as these peoples become incorporated into the modern world system. Topics in regional ethnology. Relationship of societies to major issues in anthropological thought.

Anth 3027W. Archaeology of Prehistoric Europe. (3 cr)
Early development of non-Mediterranean European society from Old Stone Age through Iron Age to the Roman Period, based on archaeological evidence. Principle transformations of European culture with introduction of agriculture, development of metallurgy, and emergence of towns and cities.

Anth 3028. Historical Archaeology of North America. (3 cr; A-F only)
Emphasizes research approaches. Documentary research, oral history, probate inventories/acculturation, integration of documents/archaeological data, analysis of community patterning, social analysis of architecture, foodways, artifact identification, mean ceramic dating, industrial archaeology, estimation of social status with cemetery data, sampling, report writing.

Anth 3029. Archaeology of Native Americans. (3 cr. Prereq–1001)
Pre-European contact and contact period archaeology of American Indians north of Mexico.

Anth 3031. Altering States: Culture and Politics in Eastern Europe. (3 cr)
Post-socialist transitions in Central and Eastern Europe from an anthropological perspective. Explores daily life under socialism and the collapse of socialist rule in relation to key areas of social life such as gender, identity, nationalism, and ethnicity.

Anth 3035. Anthropologies of Death. (3 cr; A-F only. Prereq–1003 or #)
Anthropological perspectives on death. Diverse understandings of afterlife, cultural variations in death ritual, secularization of death in modern era, management of death in medicine, cultural shifts/conflicts in what constitutes good or natural death.

Anth 3041. Ecological Anthropology. (3 cr. §5041. Prereq–1003 or #)
Concepts, theories, and methods of ecological anthropology (cultural ecology).How humans interact with biophysical environment. Compares biological/cultural interactions with environment. Examines adaptive strategies cross-culturally.

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

Anth 3045. Religion and Culture. (3 cr. Prereq–1003 or #)
Course examines religious beliefs and world views cross-culturally; religious dimensions of human life through theories of the origins, functions, and forms (e.g. myth, ritual, and symbolism) of religion in society.

Anth 3047W. Gender in Cross-Cultural Perspectives. (3 cr)
Relationship of biology and culture; cultural construction of gender and sexuality; variations in economic organization; women's involvement in ritual and religion; impact of colonialism on gender; rise of the state and gender issues.

Anth 3310. Topics in Biological and Physical Anthropology. (3-6 cr [max 6 cr]. Prereq–1001)
Topics may include faunal analysis, the human skeleton and osteology, primate and human evolution, and forensic anthropology. Topics vary according to student and faculty interest.

Anth 3913. Senior Project Planning. (1 cr. Prereq–[Jr or sr] anth major, #)
Evaluation of work to date. Planning future course work and prospectus for senior research project. Defining senior project, finding an adviser, developing preliminary bibliography.

Anth 3980. Topics in Anthropology. (3 cr [max 6 cr])
Topics specified in *Class Schedule*.

Anth 4001. Advanced Method and Theory in Archaeology. (3 cr. Prereq–1001 or 3001)
Survey and in-depth discussion of past and contemporary archaeological, theoretical, and methodological issues and approaches. Projects incorporating theories and methods. Emphasis on problem solving and integrating method and theory.

Anth 4003W. Contemporary Perspectives in Cultural Anthropology. (3 cr; A-F only. Prereq–[1003, jr] or #)
Concept of culture, practice of fieldwork as they relate to various social institutions. Anthropological perspectives on race, ethnicity, gender.

Anth 4011. Senior Seminar. (3 cr; A-F only. Prereq–Sr, anth major)
Research seminar. Topics/methodologies differ according to staff, student interests. Students complete substantial research paper.

Anth 4013. Senior Project. (3 cr. Prereq–Sr major, #)
Independent research project fulfilling the senior option; directed by a faculty member.

Anth 4019. Symbolic Anthropology. (3 cr. §8211. Prereq–1003 or grad or #)
Examines pragmatic and structural aspects of social symbolism cross-culturally with special attention to power, exchange, social boundaries, gender, and rituals of transition and reversal.

Anth 4021. Psychological Anthropology. (3 cr. §8209. Prereq–1003, 3003 or #)
Self, emotion, cognition, and child development in cross-cultural perspective. Examines cultural and social influences on personality, and psychological foundations of society and culture.

Anth 4023W. Culture Theory. (3 cr; A-F only. Prereq–Jr or sr or grad or #)
In-depth examination of key developments in the culture concept, from Darwin to present-day postmodern approaches. Examines the view that cultures have an inherent order that cannot be explained psychologically or biologically, and reactions to this view.

Anth 4025. Studies in Ethnographic Classics. (3 cr; A-F only. Prereq–1003)
Five types of explanations employed in ethnographic research: diffusionism and the theory of survivals; the functionalist response; the British structuralists; French structuralism; and the interpretive turn. Examines problems in ethnographic practice, analysis, or writing by focusing on several classic monographic examples and associated theoretical writing.

Anth 4031. Applied Anthropology. (3 cr. Prereq–1003 or 4003 or grad or #)
Introduces the practical application of theories and methods from social and cultural anthropology. Examines issues of policy, planning, implementation, and ethics as they relate to applied anthropology.

Anth 4035. Ethnographic Research Methods. (3 cr. Prereq–1003 or grad)
Introduces the history of and current issues in ethnographic research. Research projects, include participant observation, interviewing, research design, note taking, life history, and other ethnographic methods.

Anth 4043. Archaeology of Northern Europe. (3 cr)
Archaeology of Scandinavia, British Isles, and northern parts of continental Europe, from late-Bronze Age through Viking Period. Themes include art and symbolism; growth of towns; societal interactions; religion and ritual; introduction of Christianity; and development of long-distance trade.

Anth 4045. Gender and Power in South Asia. (3 cr)
Analysis of the politics of gender in South Asia, especially India, focusing on colonial and nationalist constructions of gender and "tradition"; kinship, class and gender; gender and women's speech; feminism in India; fundamentalism and postcolonial identities; gender and violence.

Anth 4047. Anthropology of American Culture. (3 cr. Prereq–1003 or 3003 or #)
Anthropological approaches to contemporary American society and culture; tensions between market and family; unity and diversity; individualism and community.

Anth 4049. Religion and Culture. (3 cr. Prereq–1003 or #)
Course examines religious beliefs and world views cross-culturally; religious dimensions of human life through theories of the origins, functions, and forms (e.g. myth, ritual, and symbolism) of religion in society.

Anth 4051. Kinship, Gender and Diversity. (3 cr. Prereq–1003)
Cross-cultural variation in meanings, expectations, and practices related to marriage, family, sexuality and parenthood. Applies knowledge of variations to cultural diversity and other issues in U.S. society (e.g. changing marriage and family forms, incest, reproductive rights, reproductive technology).

Anth 4053. Economic Anthropology. (3 cr. §8205. Prereq–1003 or 3003 or 4003 or grad)
Systems of production and distribution, especially in nonindustrial societies. Comparison, history, and critique of major theories in the field; development of a cross-cultural, anthropological approach to material life that subsumes both market and nonmarket processes, and explores the relation to theory.

Anth 4057. Politics and Law. (3 cr. Prereq–1003 or grad)
Problems of inequality, order and authority in nonstate as well as state-based societies. Historical and cross-cultural survey of the concepts through which these problems have been understood. Comparative political and legal systems, featuring case studies from Africa, Burma, New Guinea, Indonesia, and the United States.

Anth 4061. Culture and Childhood. (3 cr. Prereq–1003 or 3003 or grad)
The contexts, expectations, and tasks/activities of childhood based on case studies from diverse cultures. Application and evaluation of Western theories of child development in relation to non-Western societies. Consideration of conditions of childhood from a global perspective.

Anth 4065. Cultural Change and Development. (3 cr. Prereq–1003 or 4003 or #)
Theories of change; modernization, dependency, and world system theories. Interdisciplinary analysis of case studies from Africa, Japan, Mexico, and Native North America. Impacts of global processes on local cultures.

Anth 4067. Anthropology of Social Movements. (3 cr. Prereq–1003 or 4003 or #)
Cross-cultural study of the characteristics, functions and processes of movements of social, political, religious and ecological change. Examination of method and theory in the study of such movements. Ethnographic examples in the United States, Europe, Latin America and Africa.

Anth 4069. Environmental Archaeology. (3 cr. Prereq–1001, 3001 or grad)
Use of remains from archaeological sites and off-site records of ancient landscapes, vegetation, and climate to reconstruct how humans interacted with their environments. Interdisciplinary approaches toward reconstructing past human environments; long-term local and global environmental change.

Anth 4071. Race and Culture. (3 cr; A-F only. Prereq–1003 or 3003 or #)
Evaluation of main trends in the study of racism; psychological, sociological, symbolic, and "critical" approaches which treat racism as a sociodiscursive phenomenon. Examines racist discourse as a practice which defines an "other" and subjugates that other to strategies of exclusion.

Anth 4075. Cultural Histories of Healing. (3 cr; A-F only. Prereq–Jr or sr or grad student or #)
Introduction to historically informed anthropology of healing practice. Shift to biologically based medicine in Europe, colonialist dissemination of biomedicine, political/cultural collisions between biomedicine and "ethnomedicines," traffic of healing practices in a transnationalist world.

Anth 4980. Topics in Sociocultural Anthropology. (3-6 cr [max 6 cr]. Prereq–1003 or #)
Special topics in all specializations of social and cultural anthropology. Topics specified in *Class Schedule*.

Anth 4990. Topics in Archaeology: Seminar. (3-6 cr [max 6 cr]. Prereq–1001 or 3001 or #)
Discussion/review/analysis of specific current theoretical and/or methodological issues in archaeology. Topics specified in *Class Schedule*.

Anth 4991. Independent Study. (1-6 cr [max 6 cr]. Prereq–#)
Under special circumstances and with the approval of the instructor, qualified students may register for a listed course on a tutorial basis.

Anth 4992. Directed Readings. (1-6 cr [max 6 cr]. Prereq–#)
Allows students to pursue special interests in anthropology through reading materials under the guidance of a faculty member.

Anth 4993. Directed Study. (1-6 cr [max 6 cr]. Prereq–#)
Allows students to pursue special interests in anthropology under the guidance of a faculty member.

Anth 4994W. Directed Research. (1-6 cr [max 6 cr]. Prereq–#)
Qualified students may conduct a well-defined research project under the guidance of a faculty member.

Anth 5025W. Cultural Semantics. (3 cr)
Understanding cultures and cognitive classification systems through lexical semantics.

Anth 5027W. Origins of European Civilization. (3 cr. §3027)
Early development of European society, from Old Stone Age to Roman period. Principle transformations of European culture with introduction of agriculture, development of metallurgy and trade, and emergence of towns and cities.

Anth 5029. Philosophical Anthropology. (3 cr; A-F only. Prereq–Sr or grad or #)
Advanced survey of traditional problems associated with broad-ranging views on human nature and culture. Specific arguments of relativists, behaviorists, phenomenologists, and others in relation to social life. Structuralist and post-structuralist approaches.

Anth 5033. Feminist Anthropology. (3 cr. Prereq–3047 or grad or #)
Advanced introduction to the development of feminist theory in anthropology. Theoretical and methodological shifts in feminist anthropology and ethnography. Feminist ethnography within the discipline as a whole; current debates concerning the reading and writing of ethnography.

Anth 5041. Ecological Anthropology. (3 cr. §3041, §8213. Prereq–Grad or #)
Concepts, theories, and methods of ecological anthropology (cultural ecology) show how humans interact with the biophysical environment. Compare biological and cultural interactions with the environment; examine adaptive strategies cross-culturally.

Anth 5045. Urban Anthropology. (3 cr. Prereq–4003 or grad or #)
Anthropological approaches to urban life in Western and non-Western settings. Topics include social networks and voluntary organizations; class, ethnicity, gender and power; migration and immigration; urban labor and economics; and urban "problems."

Anth 5128. Anthropology of Learning. (3 cr)
Cross-cultural perspectives in examining educational patterns, and the implicit and explicit cultural assumptions underlying them; methods and approaches to cross-cultural studies in education.

Anth 5244. Skeletal Materials for Archaeologists. (4 cr; A-F only. Prereq–1001 or 3001 or #)
How anthropologists use fossil bones to answer questions of past human diet, behavior, and environments. Basics of skeletal-element/species identification of humans and large mammals. Project where students analyze a small assemblage of bones. Emphasizes scientific method, data analysis using computers.

Anth 5980. Topics in Anthropology. (3 cr [max 3 cr])
Topics specified in *Class Schedule.*

Anth 5990. Topics in Archaeology. (3 cr; A-F only. Prereq–#)
Topics specified in *Class Schedule.*

Applied Business (ABus)

College of Continuing Education

ABus 4011. Historical Perspectives and Contemporary Business Challenges. (3 cr; A-F only. Prereq–At least 45 cr)
Global competitiveness, product and service quality, information revolution, and changing customer/workforce demographics. Approaches to meeting contemporary challenges studied against historical backdrop of evolving management practices. Emphasizes developing systematic ways of analyzing complex problems.

ABus 4012. Problem Solving in Complex Organizations. (3 cr; A-F only. Prereq–At least 45 cr)
Open systems perspective. Analyzing root causes/effects of problems/solutions across boundaries in organization. Process analysis as problem-solving tool. Problem-solving frameworks/processes. Techniques for analyzing root causes, expanding alternatives, predicting consequences, making choices.

ABus 4021. Small Group Behavior and Teamwork. (3 cr; A-F only. Prereq–At least 45 cr)
Emphasizes work groups in organizations. Factors affecting performance/productivity. Identify formal/informal roles. How effective teamwork is created/sustained. Leadership/followership practiced.

ABus 4022. Managing Organizational Relationships. (3 cr; A-F only. Prereq–At least 45 cr)
Political dimensions of organization life. Diagnosing how power is distributed/exercised in modern organizations. Cooperative relationships, frameworks for analyzing motives for observed behavior. Skills for managing upward, lateral, and downward relationships. Recognizing potential ethical dilemmas.

ABus 4023. Communicating for Results. (3 cr; A-F only. Prereq–At least 45 cr)
Aspects of communication essential for being persuasive/influential. Organizing/presenting ideas effectively, strategies for audience analysis, choosing communication methods, making appropriate use of informal influence methods, handling dissent. Processes for intercultural communication.

ABus 4024. Effective Oral Communication and Business Presentations. (1 cr; A-F only. Prereq–BAS student with at least 45 cr)
Building/developing business presentation skills and oral communications effectiveness. Videotaping/critiques of actual presentations based on audience analysis, technique selection, and handling receptive/hostile audiences.

ABus 4025. Negotiating for Agreement. (1 cr; A-F only. Prereq–At least 45 cr)
Practical negotiating tools, hands-on practice to engage in win-win negotiations.

ABus 4031. Accessing and Using Information Effectively. (3 cr; A-F only. Prereq–Computer literacy, at least 45 cr)
Role of information in business operations. Information systems, data management. Accessing external information using information search services, CD-ROMs and periodicals. Accessing internal information using desktop database system, electronic mail, or computer conferencing. Typology of information applied in case studies and exercises.

ABus 4032. Quantitative Skills for Decision Making. (3 cr; A-F only. Prereq–College algebra, college statistics, at least 45 cr)
Exploratory data analysis, visual display of data, basic mathematical/statistical techniques for analysis. Decision theory, decision modeling.

ABus 4041. Leadership in a Global and Diverse Workplace. (3 cr; A-F only. Prereq–At least 45 cr)
Developing a global/ethical perspective to navigate changes driven by expanding global markets, need to compete with global competitors, and need to interact across cultures within/outside the organization.

ABus 4042. Planning and Implementation at the Business Unit Level. (3 cr; A-F only. Prereq–4101, 4103, at least 45 cr)
Creating/implementing operating plans. Operations flowcharts, budgets, schedules, and staffing plans. Integrating plans with overall business strategy. Factors in implementation. Developing strategies for change.

ABus 4043. Project Management in Practice. (3 cr; A-F only. Prereq–4102, at least 45 cr)
Tools/techniques to support project leader in scheduling, coordinating, and allocating resources. Field project with nonprofit community organization, smaller business, or student's employing organization.

ABus 4044. Tools for International Trade. (3 cr; A-F only. Prereq–At least 45 cr)
International forces/trends. Identifying ways in which businesses can work within context of international change. Tools used in specific transactions, ways to diagnose in what circumstances they are most appropriately applied.

ABus 4101. Accounting and Finance for Managers. (3 cr; A-F only. Prereq–One semester of lower-div principles of accounting, at least 45 cr)
Principal concepts of finance. Business decision making from accounting/financial perspective. Analysis of cost-volume-profit relationships, capital budgeting, variances, uses/sources of funds, valuation.

ABus 4102. Operations in Manufacturing and Service Businesses. (3 cr; A-F only. Prereq–At least 45 cr)
Concepts/principles related to management of operations functions. Operations strategy, process, design, just-in-time inventory management, forecasting, scheduling, quality improvement. Relationships between operations and the environment.

ABus 4103. Marketing and Sales. (3 cr; A-F only. Prereq–At least 45 cr)
Legal, behavioral, ethical, competitive, economic, and technological factors as they affect product pricing, promotion, and marketing. Personal selling function as integral part of distribution system. Sales force organization, selection, training, motivation, compensation, forecasting, budgeting, control.

ABus 4104. Management and Human Resource Practices. (3 cr; A-F only. Prereq–At least 45 cr)
Providing day-to-day leadership. Organizing work, motivating employees. Delegating, coordinating, and achieving results. Front line human resource practices, including selection, induction, and training of new employees, employee appraisal. Handling grievances/discipline.

ABus 4501. Entrepreneurship. (3 cr; A-F only. Prereq–4101, 4103, at least 45 cr)
Self-employment as alternative to employment. Phases of entrepreneurship, including identifying an opportunity, start-up, managing/harvesting a small business. Emphasizes all aspects of business plan.

ABus 4503. Technological Change, Work Organization, and Management Practices. (3 cr; A-F only. Prereq–At least 45 cr)
Evolution of work organization in the United States. Factors responsible for changes. Effect of changes on labor-management relations. Revolutions in technology, scientific management, collective bargaining, self-directed work teams, and lean production methods.

ABus 4505. Values and Ethics at Work. (1 cr; A-F only. Prereq–At least 45 cr)
Ways in which we look at work/our jobs. Religious, legal, social, cultural, and personal viewpoints. Topics may include pay equity/benefits, discrimination, product liability, corporate political contributions, loyalty, family/work conflicts, community responsibility, and role of business in society. Case examples.

ABus 4507. Change-Agent Skills. (3 cr; A-F only. Prereq–At least 45 cr)
Assessing needed change in relation to environment. Phases of change. Persuasive techniques. Shared responsibilities in carrying out change. Change as internal/external process. Leadership practices.

ABus 4509. New Product Development. (1 cr; A-F only. Prereq–At least 45 cr)
How new consumer, industrial, and service products are planned/developed. Idea generation, concept/buyer testing, pricing, sales/profit strategies, product positioning, promotion, packaging/distribution. Marketing case histories. Student projects.

ABus 4511. Small-Business Survival Skills. (1 cr; A-F only. Prereq–At least 45 cr)
Forging realistic growth trajectory. Designing adaptive organization. Identifying/building on strengths. Avoiding growth-induced failure. Coping in environment of resource poverty. Real-life cases.

ABus 4515. Changing the American Workplace: Choice or Destiny?. (3 cr; A-F only. Prereq–At least 45 cr)
Evolution of work organization. Revolutions in technology, scientific management, collective bargaining, self-directed work teams, and lean production methods. Limited to 25.

ABus 4901. Special Topics in Applied Business. (3 cr; A-F only. Prereq–At least 45 cr)
Management issues in a changing workplace. Topics vary.

ABus 4970. Directed Study. (1-3 cr; A-F only. Prereq–BAS student in applied business, #, Δ)
Specially arranged projects, trips, or fieldwork.

ABus 4999. Practicum. (3 cr; A-F only. Prereq–BAS student in applied business, at least 33 applied-business cr, #, Δ)
Project in student's employing organization or in organization providing an internship. Integrates projects from previous coursework or develops plan for new venture or expands existing business. Limited class meetings.

Applied Economics (ApEc)

Department of Applied Economics

College of Agricultural, Food and Environmental Sciences

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

ApEc 1101. Principles of Microeconomics. (3 cr)
Theory of the household and firm; demand and supply; price determination; government in the market; market structures; agriculture and food; externalities and the environment; labor markets and unions; capital and interest; project evaluation; human capital.

ApEc 1102. Principles of Macroeconomics. (3 cr. Prereq–1101 or Econ 1101)
Unemployment/inflation, measures of national income, macro models, fiscal policy/problems. Taxes and the national debt. Money/banking, monetary policy/problems. Poverty and income distribution. International trade and exchange rates. Economic growth/development.

ApEc 1251. Principles of Accounting. (3 cr. §Acct 2050. Prereq–30 cr; not recommended for premajors in AgFoodBus majors)
Fundamentals of business accounting, basic finance concepts, use of accounting data for income tax and managerial decision making.

ApEc 3000. Seminar in International Agriculture. (1 cr [max 3 cr]. Prereq–#)
Presentation and discussion of students' research papers, literature reviews of selected topics, or discussions by students and faculty of their experiences in international agriculture.

ApEc 3001. Applied Microeconomics: Consumers, Producers, and Markets. (4 cr. §Econ 3101. Prereq–[1101 or Econ 1101], [Math 1142 or Math 1271])
Consumer/producer decisions. Supply/demand, market structure. General equilibrium and welfare. Effects of government regulations, market failure.

ApEc 3002. Applied Microeconomics: Managerial Economics. (4 cr. Prereq–[3001 or Econ 3101], [OMS 1550 or Stat 3011])
Microeconomic theory, its application to managerial problems. Introduction to regression analysis, demand analysis, demand function estimation, forecasting, cost function estimation, resource allocation decisions, linear programming, market structure, pricing policy, risk analysis, investment analysis.

ApEc 3006. Applied Macroeconomics: Government and the Economy. (3 cr. §Econ 3102. Prereq–3001 or ¶3001 or Econ 3101 or ¶Econ 3101)
Public sector and market economics. Public goods, externalities, and other allocation issues. Government and stabilization of national economy. Overview of new classical/Keynesian models. Principles of taxation. Individual income tax, sales, business, and property taxes.

ApEc 3007. Applied Macroeconomics: Policy, Trade, and Development. (3 cr. Prereq–[1101 or Econ 1101], [1102 or Econ 1102]; 3006 recommended)
Foreign trade, development, and growth. General equilibrium models for affects of trading blocks on U.S. agriculture and broader economy. Importance of growth on incomes. Foreign trade. Policies that impact world trade, economic growth.

ApEc 3041W. Economic Development of U.S. Agriculture. (3 cr. Prereq–1101 or Econ 1101)
Economic, political, social, and technical forces that have shaped development of U.S. agriculture. Role of agricultural development in national economic development in the United States. Implications for developing countries.

ApEc 3071. Agriculture and Economic Growth in Developing Countries. (3 cr. Prereq–1101, 1102, Econ 1101, 1102 or #)
Characteristics and performance of peasant agriculture; potential role of agriculture in economic development, and design of economic policies to achieve agriculture and economic development; role of women in agricultural development.

ApEc 3311W. Introduction to Public Policy Analysis. (3 cr; A-F only. Prereq–1101 or Econ 1101)
Elements of public policy analysis; the policy analysts' roles; market failure; public choice; bureaucratic decision making; public services.

ApEc 3401. Markets, Marketing, and Prices. (2 cr. Prereq–1101 or Econ 1101)
Market structure; demand and supply structure; regulations and institutions that influence the behavior of firms in agricultural marketing systems; performance in food assembly, manufacturing, and distribution industries.

ApEc 3411. Grain Marketing Economics. (3 cr. Prereq–1101 or Econ 1101)
Economic relationships in marketing of grain, grain products. Grain grades, storage/transportation, market structure, channels, pricing, competition. Government programs/policies.

ApEc 3421. Livestock and Meat Marketing Economics. (3 cr. Prereq–1101 or Econ 1101)
Economic relationships in marketing of livestock, dairy, and meat products. Product grades. Inspection/transportation. Market structure, channels, pricing, and competition. Government regulations/policies.

ApEc 3451. Food and Agricultural Sales. (3 cr. Prereq–1101 or Econ 1101)
Professional selling of agricultural and food products. Students build/refine sales abilities, identify/qualify prospects, deliver sales presentations, close the sale. Principles of market research.

ApEc 3501. Agribusiness Finance. (3 cr. §Fina 3001. Prereq–[[1251 or Acct 2050], 60 cr] or #)
Analysis of financing and investment strategies for agribusiness firms and their effects on liquidity, solvency, and profitability. Analysis of financial institutions, markets, and instruments. Management problems, issues facing financial intermediaries serving agriculture.

ApEc 3801. Health Economics and Policy. (3 cr. Prereq–[[1101 or Econ 1101], knowledge of plane geometry] or #)
Economics of health care markets. Problems faced by consumers and health care services. Builds on microeconomic principles of supply/demand for health, health care, health insurance, and role of government. Theoretical/empirical models, applications.

ApEc 3811. Principles of Farm Management. (3 cr. Prereq–1101 or Econ 1101)
Strategic and operations aspects of farm management; financial analysis, budgeting, strategic management; marketing plan and control; enterprise and whole farm planning and control; investment analysis, quality, risk, and personnel management.

ApEc 3821. Retail Center Management. (3 cr. Prereq–[1101 or Econ 1101], [1251 or Acct 2050])
Management of garden centers, grocery stores, and other retail units selling perishable agricultural products.

ApEc 3921. Agricultural Law. (3 cr; A-F only. Prereq–1101 or Econ 1101)
The legal system. Contracts. Torts. Farm tenancy. Property. Drainage/environmental concerns. Credit/finance. Partnerships, corporations, cooperatives. Estate planning.

ApEc 3991. Independent Study in Applied Economics. (1-4 cr. Prereq–#)
Independent study and supervised reading and research on subjects and problems not covered in regularly offered courses.

ApEc 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; S-N only. Prereq–COAFES jr or sr, #, complete internship contract available in COAFES Career Services before registering)
Professional experience in agribusiness firms or government agencies gained through supervised practical experience; evaluative reports and consultations with faculty advisers and employers.

ApEc 4103. World Food Problems. (3 cr. §Agro 4103, §CAPS 4103, §FScN 4103. Prereq–Jr or sr or grad)
A multi-disciplinary look at problems and possible solutions affecting food production, storage, and utilization in developing countries. Presentations and discussions introduce conflicting views on population, technology, and ethical and cultural values of people in various parts of the world.

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

ApEc 4451. Food Marketing Economics. (3 cr. Prereq–[1101 or Econ 1101], [1102 or Econ 1102])
Economics of food marketing in the United States. Food consumption trends, consumer food behavior, marketing strategies, consumer survey methodology, food distribution and retailing system, food policy issues related to food marketing. Individual/group projects.

ApEc 4451W. Food Marketing Economics. (3 cr. Prereq–[1101 or Econ 1101], 60 cr)
Economics of food marketing in the United States. Food consumption trends, consumer food behavior, marketing strategies, consumer survey methodology, food distribution/retailing system. Policy issues related to food marketing. Individual/group projects.

ApEc 4481. Futures and Options Markets. (3 cr. Prereq–[3001 or Econ 3101], [OMS 1550 or Stat 3011], 60 cr)
Economics of futures/options trading in theory/application. Basis/price relationship in storable/nonstorable commodities. Hedging/commercial use of futures/options contracts. Speculation. Pricing efficiency. Market performances/regulation.

ApEc 4611. Resource Development and Environmental Economics. (3 cr. §Econ 3611. Prereq–[1101 or Econ 1101], [1102 or Econ 1102], 60 cr)
Basic concepts of resource use. Financial/economic feasibility. External effects, market failures. Resource use, environmental problems. Measuring impacts of resource development. Economics of alternative resource programs, environmental strategies.

ApEc 4821W. Agribusiness Management. (5 cr. Prereq–3002, [3501 or Fina 3001], Mgmt 3001)
Strategic/operations management for production, processing, wholesaling, retailing, and service. Establishing mission/goals. Strategy formulation, implementation, and control. Quality management, process selection, operations planning, inventory management, human resource issues. Business plans. Case study analysis.

ApEc 5031. Methods of Economic Data Analysis. (3 cr. Prereq–Math 1271, Stat 5021, knowledge of matrix algebra)
Statistical and econometrics techniques for applied economists. Theory and application of multivariate regression model using data sets from published economic studies. Emphasis on use of statistical technique to understand market behavior.

ApEc 5151. Applied Microeconomics: Firm and Household. (2 cr. Prereq–¶Econ 5151 or #)
Quantitative techniques for analysis of economic problems of firms and households. Links between quantitative tools and economic analysis developed to understand economic theory and develop research skills. Quantitative tools include regression analysis, mathematical programming, and present value analysis.

ApEc 5152. Applied Macroeconomics: Income and Employment. (2 cr. Prereq–¶Econ 5152 or #)
Static general equilibrium open economy models and simple business cycle models examine economic growth, business cycles, and fiscal and monetary policy. Input-output analysis and large scale econometric models. Sources and properties of economy and sector-wide data, and empirical applications.

ApEc 5321. Regional Economic Analysis. (3 cr. Prereq–3006 or Econ 3102 or #)
Regional development patterns and role of resources, transportation, and institutional constraints. Trade, migration, and investments in regional growth and change. Regional economic information in investment and location decisions. Evaluation of economic development policies and tools. Economic impact analysis.

ApEc 5341. State and Local Public Services and Finance. (3 cr; A-F only. Prereq–3001 or equiv)
The organization, delivery, economic analysis and finance of state and local public services and functions.

ApEc 5401. Price Analysis, Futures, and Options Markets. (3 cr. Prereq–[3002 with grade of at least B, [Math 1142 or equiv]] or grad student)
Development/application of price models. Unique market institutions in agriculture that have been developed in response to marketing/pricing problems. Futures/options trading. Hedging, speculative uses of futures/options contracts. Price efficiency, market performance/regulations.

ApEc 5511. Labor Economics. (3 cr. Prereq–[[3001 or Econ 3101 or PA 5021], [PA 5032 or equiv], grad student] or #)
Theoretical foundations of labor markets. Intertemporal/household labor supply. Demand for labor, efficiency wages. Human capital theory, unemployment, migration decisions. Analysis of econometric research applied to labor policy issues such as minimum wage, tax policy, social insurance, education.

ApEc 5551. Food Marketing Economics. (3 cr; A-F only. §4451, §FScN 4451. Prereq–3001 or Econ 3101)
Economics of food marketing in the United States. Food consumption trends. Consumer food behavior, expenditure, data collection. Consumer utility models, demand forecasting. Food distribution system. Changes in supply chain, industry structure that serves retail food outlets. Individual/group projects.

ApEc 5581. Human Capital and Household Economics. (3 cr. Prereq–3001 or Econ 3101 or #)
Household economics and investment in human capital (e.g., children, education, health and nutrition); labor force participation, lifetime earnings, and nonmarket work; time allocation and substitution of capital for labor in the household in the western and third world.

ApEc 5611. Land and Water Economics. (3 cr. Prereq–3001 or Econ 3101 or #)
Land as an economic and cultural resource. Property rights concepts, valuation of resources, and policy analysis. Materials drawn from economics, forestry, public finance, planning, and agriculture.

ApEc 5637. Agricultural Law. (3 cr. Prereq–Sr or grad or #)
Economic regulation of agriculture. Industrial organization and market structure in agribusiness, public lands and water law, agricultural cooperatives, farm labor, farm finance, crop insurance and disaster assistance, agricultural biotechnology, food and drug law, price and income regulations, and international agricultural marketing.

ApEc 5651. Economics of Natural Resource and Environmental Policy. (3 cr. Prereq–[3001 or Econ 3101], [4611 or Econ 3611 or NRES 3261W], 60 cr)
Economic analyses, including project evaluation of current natural resource/environmental issues. Emphasizes intertemporal use of natural resources, natural resource scarcity/adequacy, environmental quality, and mechanisms for pollution control and their implications for public policy.

ApEc 5711. U.S. Agricultural and Environmental Policy. (3 cr. Prereq–3001 or Econ 3101)
U.S. agricultural policy in an open world economy; role of private markets and government in regulating supply and demand; income vs. price support, supply controls, environmental constraints, and export protectionism; functioning of markets; roles of public interest groups and future of American agricultural policy.

ApEc 5721. Economics of Science and Technology Policy. (3 cr. Prereq–[[5151 or ¶5151], PA 5022] or #)
Economics of technical change, research, and technology. Productivity. Methods for evaluating impacts of R&D. Intellectual property rights.

ApEc 5731. Economic Growth and International Development. (3 cr. Prereq–3002 or [Econ 3101, Stat 3022]; Econ 4211 recommended)
Economics of research/development. Technical change, productivity growth. Impact of technology on institutions. Science/technology policy.

ApEc 5751. Agricultural Trade and Trade Policy: Issues and Analysis. (3 cr. Prereq–3001 or Econ 3101 or PA 5021)
Trade policies of import/export nations, gains from trade, trade negotiations/agreements. Free trade and common market areas. Exchange rate impacts. Primary commodities and market instability. Current trade issues.

ApEc 5811. Cooperative Organization. (3 cr. Prereq–3001, 3002 or #)
Application of economic analysis to the cooperative form of organization. Producer and consumer cooperatives used to examine economic issues such as changing market organization, financing, management incentives, taxation, and antitrust regulations. Cooperatives as a tool for economic development included.

ApEc 5861. Economics of Agricultural Production. (3 cr. Prereq–5151 or Econ 5151 or #)
Production economics applied to agriculture, profitable combination of production factors; comparative advantage and location of production.

ApEc 5891. Independent Study: Advanced Topics in Farm and Agribusiness Management. (1-4 cr. Prereq–#)
Special topics or individual work suited to the needs of particular groups of students.

ApEc 5991. Special Topics and Independent Study in Applied Economics. (1-4 cr [max 12 cr]. Prereq–#)
Special classes, independent study, and supervised reading and research on subjects and problems not covered in regularly offered courses.

Arabic (Arab)

Department of African American and African Studies

College of Liberal Arts

Arab 1101. Beginning Arabic. (5 cr)
Oral practice, reading, comprehension, basic grammar. For students with no previous training in Arabic.

Arab 1102. Beginning Arabic. (5 cr. Prereq–1101 or equiv or #)
Comprehension, oral practice, and reading of standard Arabic. Continuation of 1101.

Arab 1201. Colloquial Arabic. (5 cr)
Fundamentals of vocabulary and sentence structure. Introduction to Arabic script. Primarily for business persons and travelers.

Arab 1202. Colloquial Arabic. (5 cr. Prereq–1201 or #)
Fundamentals of vocabulary and sentence structure. Introduction to Arabic script. Primarily for business persons and travelers.

Arab 3036. Islam: Religion and Culture. (3 cr. §Afro 5036)
Religion of Islam, faith, practices, sectarian splintering, expansion outside original home to status of world religion, institutions, status in world societies—Asia, Europe, the Americas.

Arab 3101. Intermediate Arabic I. (5 cr. Prereq–1102 or equiv or #)
Advanced grammar and conversational practice. Reading Arabic texts.

Arab 3102. Intermediate Arabic II. (5 cr. Prereq–3101 or #)
Advanced grammar, analyses of readings, oral comprehension.

Arab 3491. Classical Islamic Civilization. (3 cr. §Afro 5491)
Islamic legacy in the classical age (800-1400), including medical and natural sciences, mathematics, philosophy, literature, and their transmission to Europe.

Arab 3505. Survey of the Middle East. (3 cr. §5505)
Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present.

Arab 3514. African-Arabic Literature in Translation. (3 cr)
Literature from continental Africa in Arabic. Novels, short stories, poetry, and drama by such writers as Abd-al-Hayy, Abd-al-Sabur, Mahfouz, El-Saadawi, and Wattar. No knowledge of Arabic required.

Arab 3524. Introduction to the Qur'an. (3 cr)
Textual, thematic, interpretive, and narrative aspects of the Qur'an and its influence on modern Arabic literature. All readings in English.

Arab 3541. Islam in the Catholic Age: Arab Phase 600 A.D. to 900 A.D. (3 cr. §5541)
The rise of Islam in its Arabian setting. Roles of the prophet, the Orthodox and Umayyad Caliphs. Development of the Islamic state and empire. Status of Muslims and non-Muslims.

Arab 3542. Medieval Islam. (3 cr. §5542)
Islamic dynasties, Mamluks and Mongols, and Crusaders and Assassins. Abbasid Caliphate's disintegration and rise of Seljuk Turks.

Arab 3543. Arabs Under Mamluks and Ottomans: 1300-1920. (3 cr.§5543)
Struggle against Crusaders and Mongols. Disintegration and reemergence under Muhammad Ali of Egypt; dynastic struggles in Syria; rise of Young Turks; Arab revolt.

Arab 3544. Arab World: 1920 to the Present. (3 cr)
Struggle in the Arab world for independence and its course since independence. Emphasis on development, political stability and unity; political structures; the Arab-Israeli conflict.

Arab 3547. The Ottoman Empire. (3 cr)
Founding of Ottoman society and state to empire, 1300 to end of the empire in 1920. Lands, institutions, peoples, legacy, impact on Europe.

Arab 3900. Topics In Arabic Literature, Art, and Culture. (3 cr [max 6 cr])
Topics vary. Readings are in English.

Arab 3993. Directed Study. (1-3 cr. Prereq–#)
For advanced students with individual faculty members.

Arab 5001. Research Methods in Arabic Studies. (3 cr)
Skills and techniques required to deal with medieval and modern works in Arabic literature and Islam. A survey of the most important research bibliographies in Arabic and Islamic studies. Bibliographic references in English and, when appropriate, Arabic.

Arab 5011. Islam in Africa. (3 cr)
Ideological, doctrinal, and ritual aspects of continental African Islam. Emphasis on various religious brotherhoods and Sufi orders from different African countries in the 20th century. No knowledge of Arabic required.

Arab 5036. Islam: Religion and Culture. (3 cr. §Afro 3036)
Religion of Islam, faith, practices, sectarian splintering, expansion outside original home to status of world religion, institutions, status in world societies - Asia, Europe, Americas.

Arab 5101. Advanced Arabic I. (3 cr. Prereq–3102 or equiv or #)
Advanced readings in classical and modern Arabic. Compositions based on texts.

Arab 5102. Advanced Arabic II. (4 cr. Prereq–5101 or #)
Readings of Arabic texts. Writing compositions based on texts. Continuation of 5101.

Arab 5491. Classical Islamic Civilization. (3 cr. §Afro 3036)
Islamic legacy in the classical age (800-1400), including medical/natural sciences, mathematics, philosophy, literature, and their transmission to Europe.

Arab 5501. Modern Arabic Poetry in Translation. (3 cr)
Free verse movement and its major trends: post-romantic, social realist, symbolist, resistance, prose poem. Emphasizes leading poets such as al-Mala'ika, al-Sayyab, al-Bayati, and Adunis. Theoretical/critical essays. All readings in English.

Arab 5502. Arabic Novel in Translation. (3 cr)
The novel as a new genre in Arabic literature. Trends: realist, psychological, existentialist, feminist, post-modernist, fantastic, experimentalist. Emphasizes major writers such as Mahfouz, Ghanem, Salih, Jabra, El Sa'dawi, Munif, and Khouri. Theoretical/critical essays. Cultural / historical context.

Arab 5503. Arabic Drama in Translation. (3 cr)
Emergence and development of drama as a European-inspired genre in Arabic literature. Emphasizes major trends and playwrights. All readings in English.

Arab 5505. Survey of the Middle East. (3 cr. §3505, §Hist 3505, §MELC 3505)
Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present.

Arab 5541. Islam in the Catholic Age: Arab Phase 600 A.D. to 900 A.D. (3 cr. §3541)
The rise of Islam in its Arabian setting. Roles of the prophet, the Orthodox and Umayyad Caliphs. Development of the Islamic state and empire. Status of Muslims and non-Muslims.

Arab 5542. Medieval Islam. (3 cr. §3542)
Islamic dynasties, Mamluks and Mongols, and Crusaders and Assassins. Abbasid Caliphate's disintegration and rise of Seljuk Turks.

Arab 5543. Arabs Under Mamluks and Ottomans: 1300-1920. (3 cr. §3543)
Struggle against Crusaders and Mongols. Disintegration and reemergence under Muhammad Ali of Egypt; dynastic struggles in Syria; rise of Young Turks; Arab revolt.

Arab 5544. Arab World: 1920 to the Present. (3 cr. §3544)
Struggle in the Arab world for independence and its course since independence. Emphasis on development, political stability and unity; political structures; the Arab-Israeli conflict.

Arab 5678. Seminar: African-Arabic Fiction in Translation. (3 cr)
African fiction in Arabic, including works of Barrada, Idris, Mahrouz, al-Matwi, El-Saadawi, and el-Zayat. Emphasizes twentieth century. Tests discussed in historical/cultural context. Theoretical/ critical essays. All readings in English.

Arab 5900. Topics in Arabic Literature and Culture. (3 cr [max 9 cr]. Prereq–5102 or #)
Readings and discussion of selected works in Arabic. Topics specified in *Class Schedule.*

Arab 5992. Directed Readings. (1-3 cr. Prereq–#)
Individual research and readings for advanced students.

Aramaic (Arm)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Arm 5011. Biblical Aramaic and Old Aramaic Inscriptions. (3 cr. Prereq–1 yr Hebrew or Arabic or #)
Biblical Aramaic—grammar, fluency in reading Biblical Aramaic and Old Aramaic inscriptions.

Arm 5012. Syriac. (3 cr. Prereq–1 yr Hebrew or Arabic or #)
Emphasis on fundamentals of grammar and reading Syriac texts fluently.

Architecture (Arch)

Department of Architecture

College of Architecture and Landscape Architecture

Arch 1301. Introduction to Drawing in Architecture and Landscape Architecture. (3 cr; A-F only)
Development of basic skills involved in perceiving and representing the material environment. Study of sketching and drawing conventions of visual phenomena and forms.

Arch 1401. The Designed Environment. (3 cr; A-F only)
Examination of seminal issues in the designed environment, including relationships between place and space, and realms of the ideal and real, public and private. Survey of how the fields of architecture, landscape architecture, and urban design have explored those issues.

Arch 1421H. Honors: The Designed Environment. (3 cr; A-F only. Prereq–[Fr or soph], honors; meets HON req)
How seminal issues (e.g., relationships of place, space, ideal/real, public/private) have been reflected in, explored through architecture, landscape architecture, urban design.

Arch 3301. Drawing for Design in Architecture. (3 cr; A-F only. Prereq–[[1301 or LA 1301], [pre-Arch or Arch or BED]] or #)
Introduction to conceptual function of drawing in architecture. History of drawing in architecture, critical review of drawing conventions/systems, exploration of drawing processes.

Arch 3401V. Honors: Environmental Design and the Sociocultural Context. (3 cr. Prereq–1401 or LA 1401 or #)
The designed environment as a cultural medium and product of a sociocultural process and expression of values, ideas, and behavioral patterns. Study of design and construction as a complex political process.

Arch 3401W. Environmental Design and the Sociocultural Context. (3 cr. Prereq–1401 or LA 1401 or #)
The designed environment as a cultural medium and product of a sociocultural process and expression of values, ideas, and behavioral patterns. Study of design and construction as a complex political process.

Arch 3411. Architectural History to 1750. (3 cr)
History of architecture and city planning from antiquity to 1750, as illustrated by major monuments from western and non-western cultures.

Arch 3412. Architectural History Since 1750. (3 cr)
History of structure, cities, sites, and theories of architecture and urbanism since 1750.

Arch 3490H. Honors Theory Seminar. (3 cr; A-F only. Prereq–[CLA BA or CALA BS] honors or #)
Topics selected by faculty, from their area of scholarship, in contemporary issues from literature of architecture. Specific buildings or building types, or areas of architectural thought, history, representation, design, technology. See *Class Schedule.*

Arch 3611. Design in the Digital Age. (3 cr; A-F only)
Introduction to design, design process. Developing/ understanding ways of seeing, thinking, and acting as a designer. Changes in design being wrought by digital technology. Team design project.

Arch 3993. Directed Study. (1-4 cr. Prereq–# only)
Guided individual reading or study.

Arch 4542. Building Energy Systems. (3 cr; A-F only)
Functions of building mechanical systems and their integration with other building components. Residential/commercial HVAC systems, alternative energy sources, energy effciency, structural implications of mechanical systems, indoor air quality, environmental strategies. Case studies.

Arch 4572. Structrual Frames and Building Design/ Construction. (3 cr; A-F only)
Basic contemporary structural systems in masonry, steel, and wood framing systems. Forms/ performance of systems.

Arch 5241. Principles of Design Programming. (3 cr; A-F only. Prereq–For undergrads 5122, BA Arch major; for grads 8255, M Arch major or #)
Concepts and techniques of architectural programming, including space and activity analysis, site selection, precedent study, code review, appropriate technology identification, hypothesis formulation and evaluation. Emphasis on conceptual development, research, and analytic drawing.

Arch 5250. Advanced Topics in Design. (1-6 cr [max 6 cr]; A-F only. Prereq–Arch or #)
Advanced topics in design.

Arch 5281. Undergraduate Architecture Studio I. (6 cr; A-F only. Prereq–[[3411 or 3412], Arch major] or #)
Architectural questions in settlement patterns, architectural elements in their formal organization. Mapping techniques, orthographic projections, analytic drawing, models.

Arch 5282. Undergraduate Architecture Studio II. (6 cr; A-F only. Prereq–5281, Arch major or #)
Exploration of human response to the natural forces of gravity, light, and air and their influence on the organization of material form to create places of human habitation.

Arch 5283. Undergraduate Architecture Studio III. (6 cr; A-F only. Prereq–[5281, 5282, Arch] or #)
Exploration of selected design issue or topic, its influence on organization of material form to create places of human habitation.

Arch 5284. Undergraduate Architecture Studio IV. (4 cr; A-F only. Prereq–[5283, BS architecture major] or Δ)
Design studio.

Arch 5291. Accelerated Undergraduate Architecture Studio I. (6 cr; A-F only. Prereq–#)
Selected architectural problems developed by faculty to deepen/enrich ideas introduced in required architectural studio sequence.

Arch 5292. Accelerated Undergraduate Architecture Studio II. (6 cr; A-F only. Prereq–[5291, accelerated status] or #)
Architectural problems. Emphasizes development of structures as integral part of design, site planning, design process.

Arch 5313. Visual Communication Techniques in Architecture. (3 cr; A-F only. Prereq–For undergrads 3301, BA Arch or BED major; for grads M Arch major or #)
Exploration of delineation, presentation, and design techniques, using various visual media and methods of investigation.

Arch 5321. Architecture in Watercolor. (3 cr; A-F only. Prereq–[3301, [Arch or BED]] or M Arch grad student or #)
Watercolor as a tool in the design process. Survey of foundation principles, techniques, medium, tools, and materials. Exploration of color relationships, mixing, composition, and applications to design.

Arch 5350. Topics in Architectural Representation. (1-3 cr [max 9 cr]; A-F only. Prereq–[5321, [Arch major or M. Arch major]] or #)
Selected topics in architectural representation.

Arch 5351. AutoCAD I. (3 cr. Prereq–For undergrads 5281, arch major; for grads MArch major or #; may not be taken for graduate credit)
Basic concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release. Strategies and techniques for producing dimensioned and annotated drawings suitable for plotting and an introduction to 3-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.

Arch 5352. AutoCAD II. (3 cr. Prereq–For undergrads 5351, arch major; for grads MArch major or #; may not be taken for graduate credit)
Intermediate concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release. Strategies and techniques for producing dimensioned and annotated drawing suitable for plotting. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.

Arch 5361. Topics in Architectural Representation: 3-D Architectural Modeling and Design. (3 cr; A-F only. Prereq–For undergrads 5281 or 5351, arch major; for grads MArch major or #)
Introduction to 3-D studio for architectural modeling, rendering, and animation. Video recording and editing.

Arch 5381. Introduction to Computer Aided Architectural Design. (3 cr; A-F only. Prereq–Arch or BED or MArch or grad student in LA or #)
2-D drawing, 3-D modeling/animation, printing, plotting. Electronic networking/communications, database management, spreadsheet analysis, land-use analysis, project management.

Arch 5382. Computer Aided Architectural Design. (3 cr; A-F only. Prereq–[5381, undergrad, [BA Arch major or BED major]] or MArch major or graduate LA major or #)
2-D/3-D CAD, image manipulation. Advanced multimedia visualization techniques for design, including solid modeling, photo-/realistic imaging, animation, video-editing/recording.

Arch 5410. Topics in Architectural History. (3 cr [max 12 cr]; A-F only. Prereq–For undergrads 3412, arch major; for grads MArch major or #)
Advanced study in architectural history. Readings, research, and seminar reports.

Arch 5423. Gothic Architecture. (3 cr; A-F only. Prereq–For undergrads 3411, arch major; for grads MArch major or #)
History of development of architecture and urban design in Western Europe from 1150 to 1400.

Arch 5424. Renaissance Architecture. (3 cr; A-F only. Prereq–For undergrads 3411, arch major; for grads MArch major or #)
History of architecture and urban design in Italy from 1400 to 1600. Emphasis on major figures (Brunelleschi, Alberti, Bramante, Palladio) and the evolution of major cities (Rome, Florence, Venice).

Arch 5425. Baroque Architecture. (3 cr; A-F only. Prereq–For undergrads 3411, arch major; for grads MArch major or #)
Architecture and urban design in Italy from 1600 to 1750. Emphasis on major figures (Bernini, Borromini, Cortona, Guarini) and the evolution of major cities (Rome, Turin).

Arch 5426. Architecture and Nature: 1500-1750. (3 cr. Prereq–For undergrads 3411, 3412, arch major; for grads MArch major or #)
History of the interaction of architecture and nature in Italy, England, and France in the 16th and 17th centuries. Major monuments, their relationship to theories of architecture and gardening, urban and rural life.

Arch 5431W. Eighteenth-Century Architecture and the Enlightenment. (3 cr; A-F only. Prereq–[3411, 3412, undergrad arch major] or MArch grad student or #)
Architecture, urban planning, and garden design in Europe from 1700 to 1850.

Arch 5432. Modern Architecture. (3 cr; A-F only. Prereq–For undergrads 3412, arch major; for grads MArch major or #)
Architecture and urban design in Europe and the United States from the early 19th century to World War II.

Arch 5434. Contemporary Architecture. (3 cr; A-F only. Prereq–For undergrads 3412, arch major; for grads MArch major or #)
Developments, theories, movements, and trends in architecture and urban design from World War II to the present.

Arch 5439. History of Architectural Theory. (3 cr; A-F only. Prereq–For undergrads 3412, arch major; for grads MArch major or #)
History of architectural theory from antiquity to the 20th century.

Arch 5450. Topics in Architectural Theory. (1-3 cr [max 9 cr]; A-F only. Prereq–Arch major or MArch major or #)
Selected topics in architectural theory and criticism.

Arch 5458. Architecture and Culture. (3 cr; A-F only. Prereq–3412, arch major or grad student or #)
Architecture as a cultural medium. Relationships among architecture, people, and culture; research findings and design; vernacular and high style architecture. Physiological and symbolic messages; reception theory in architecture; cultural critique and change; implications for architectural practice.

Arch 5459. Gender and Architecture. (3 cr. Prereq–Arch or WoSt major or MArch major or #)
Examination of ideas related to gender and architecture, gendered and non-gendered places and practices, and their relations to cultural norms and change.

Arch 5461. North American Indian Architecture. (3 cr. Prereq–For undergrads 3412, arch or AmIn major; for grads MArch major or #)
Historic and contemporary principles and theories of North American Indian architecture. Study of the culture, technology, environment, art and craft of North American Indians in their settlements and architecture.

Arch 5501. Architecture and Ecology. (4 cr; A-F only. Prereq–[5281, LA 3501, arch major] or #)
Introduction to theories/practices of ecological approaches to architectural design. Ecological context, implications/opportunities of architecture. Historical/theoretical framework for ecological design thinking. Issues studied at a variety of scales: site/community, building scale, component scale. Fundamental theories, concepts, principles, strategies, and design tools addressed at each scale.

Arch 5511. Construction Materials in Architecture. (3 cr; A-F only. Prereq–MArch major or #)
Study and analysis of building materials, assemblies, and construction operations shaping building designs. Examination of material properties for design and detailing of building systems, elements, and components, and their implications in design applications. Modeling and hands-on building experiences.

Arch 5550. Topics in Technology. (1-3 cr [max 6 cr]. Prereq–#)
Selected topics in architecture technology, including construction, environmental management, energy performance, lighting, or materials.

Arch 5561. Building Production Processes. (3 cr. Prereq–5282, 5501, arch major or BED major or MArch major or #)
Introduction to design-build processes including document production, contract execution, and building project management. Case study and hands-on experiences examine construction industry organization, scheduling, consultant relations, legal and code restraints, contractual stipulations, budget and project resource allocations.

Arch 5571. Architectural Structures I: Wood and Steel Design. (3 cr; A-F only. Prereq–MArch major or #)
Influence of history and culture on architecture and structure. Fundamentals of structural mechanics, structural analysis, structural form finding, and structural design by experimental, qualitative/intuitive, and quantitative methods. Vector-active and form-active structural systems, funicular structures, bending and compression elements, plates and grids, tensile architecture, shells. Description of traditional construction materials.

Arch 5611. Design in the Digital Age. (3 cr; A-F only. Prereq–Grad student or upper level undergrad)
Introduction to design, design process. Developing/understanding ways of seeing, thinking, and acting as a designer. Changes in design being wrought by digital technology. Team design project.

Arch 5650. Topics in Architectural Practice. (1-4 cr. Prereq–5621, arch major or 5621, MArch major or #)
Topics in architectural practice, methods of design production, marketing, operation, and relationships among clients, architecture, and society.

Arch 5670. Topics in Historic Preservation. (1-3 cr. Prereq–Arch or MArch major or #)
Selected topics in the theory, philosophy, research, and methods of architectural historic preservation.

Arch 5671. Historic Preservation. (3 cr. Prereq–3412 or #)
Philosophy, theory, and origins of historic preservation. Historic archaeology and research, descriptive analysis, and documentation of historic buildings. Government's role in historic preservation, preservation standards and guidelines, preservation and building codes, neighborhood preservation, preservation advocacy, and future directions for historic preservation. Research on architectural and historical aspects of historic sites using primary and secondary resources and on controversial aspects of preservation.

Arch 5672. Historic Building Conservation. (3 cr. Prereq–3412, 5671 or #)
Historic building materials, systems, and methods of conservation. Discussion of structural systems, building repair and pathology, introduction of new environmental systems in historic buildings, and conservation of historic interiors. Research on historic building materials and techniques using primary and secondary resources and on documentation of a specific historic site through large-format photography and measured drawings.

Arch 5673. Historic Building Research and Documentation. (3 cr. Prereq–3412, 5672 or #)
Philosophy, theory, and methods of historic building research, descriptive analysis of buildings, building documentation, historical archaeology, and architectural taxonomy.

Arch 5711. Design Principles of the Urban Landscape. (3 cr; A-F only. Prereq–Arch or BED major or MArch or LA grad major or #)
Art and design of creating city, neighborhood, and development plans. Public policies, planning tools and process, and physical models used by design professionals and private and civic institutions to shape the physical environment.

Arch 5724. Meanings of Place. (3 cr; A-F only. Prereq–Arch or BED or Geog major or MArch or LA grad major or #)
Analysis of meanings and messages of surroundings, and examination of links between sense of place and feelings of well-being. Exploration of what present-day environments can reveal about the past. Survey of Twin Cities' central district and selected neighborhoods, and other settings inside and outside Minnesota.

Arch 5993. Directed Study. (1-4 cr; A-F only. Prereq–# only)
Guided individual reading or study.

Art (ArtS)

Department of Art

College of Liberal Arts

ArtS 1001W. Introduction to Visual Arts. (4 cr)
Concepts of visual art-making in contemporary and historical contexts. The media, environment, and concerns of the practicing artist. Creative process, visual expression, criteria. Aesthetic foundation for beginning studio courses. Required of all art majors.

ArtS 1101. Drawing. (4 cr)
Introduction to fundamental principles and processes of drawing; exploration of various drawing media. Work from still life, nature, the life model, and imagination.

ArtS 1102. Painting. (4 cr. Prereq–1101 or #)
Introduction to painting with attention to understanding and applying the fundamental principles of spatial organization and color interaction.

ArtS 1301. Sculpture. (4 cr)
An introduction to sculptural practice examining materials, methods, concepts, and history with emphasis on the correlation between concepts and materials. Work in clay, plaster, metal, and wood.

ArtS 1501. Printmaking. (4 cr)
Introduction to techniques of printmaking: woodcut, etching, lithography, and screen printing. Historical approaches and use through contemporary materials and concepts. Emphasis on the interrelationship of process, materials, and ideas.

ArtS 1505. Papermaking. (4 cr)
Introduction to approaches, forms, and aesthetic possibilities of paper as an expressive medium. Studio work in both Eastern and Western traditions and sculptural applications.

ArtS 1601. Electronic Art. (4 cr)
Introduction to the use of computer technologies as a source for creative art making. Emphasis on producing digital fine art in the context of computer based ideas such as interactivity, virtuality, agency, and community.

ArtS 1701. Photography. (4 cr)
Presents conceptual, technical, and historical aspects of photography within the fine arts context. Emphasis on the creative process through hands-on experience in use of camera, film development, enlarging, and printing.

ArtS 1801. Ceramics. (4 cr)
Fundamentals of wheel-thrown and hand-built ceramics as forms of creative expression. Introduction to clay, glazes, and firing techniques.

ArtS 1902. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

ArtS 1905. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

ArtS 1910W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule*.

ArtS 3101. Intermediate Drawing. (4 cr. Prereq–1001, 1101)
Further exploration and understanding of drawing elements with emphasis on developing visual judgment, drawing process, and execution. Specific problems to promote the understanding of pictorial structure and personal expression.

ArtS 3102. Intermediate Painting. (4 cr. Prereq–1001, 1101, 1102)
Emphasizes development of visual sensibility, individual direction, critical judgment.

ArtS 3105. Dimensional Painting. (4 cr. Prereq–1001, 1101, 1102)
Application of two-dimensional visual concerns as they relate to sculptural form. Exploration of how painting ideas affect perception of real space.

ArtS 3106. Drawing: Interpreting the Site. (4 cr. Prereq–1001, 1101)
Field trips to draw or paint in various metropolitan area locations. Site interpretations, experimentation with marks/symbols. Focuses on search for personal content as inspired by site.

ArtS 3111. Life Drawing I. (4 cr. Prereq–1001, 1101)
Focus on the human form with an introduction to anatomy. Exploration of various concepts of representation and methods of image construction. Work from life, anatomical casts, memory and imagination.

ArtS 3112. Life Drawing II. (4 cr. Prereq–3111 or #)
The human form in pictorial structure, single, and multiple figure compositions. The creative process, work toward a personal direction. Attention to representation of the human image in cultural, historical, and contemporary context.

ArtS 3301. Sculpture: Direct Metal. (4 cr. Prereq–1001, 1301)
Constructive approach to sculpture through welding in steel, other metals. Studio practice, investigation of historical/contemporary methods/concepts.

ArtS 3302. Sculpture: Spatial Problems. (4 cr. Prereq–1001, 1301)
Focuses on sculptural practice outside traditional media/approaches. Theoretical constructions of space as primary medium of sculpture. Installation, theater, public art, architecture.

ArtS 3303. Sculpture: Metalcasting. (4 cr. Prereq–1001, 1301)
Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods/concepts.

ArtS 3304. Sculpture: Carving and Construction. (4 cr. Prereq–1001, 1301)
Carving/construction using wood, other materials. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery.

ArtS 3305. Sculpture: Kinetics. (4 cr. Prereq–1001, 1301)
The exploration of movement in sculpture (wind, water, electric). Studio practice and investigation of historical and contemporary methods and concepts.

ArtS 3306. Performance Art and Installation. (4 cr. Prereq–1001, 1301)
Studio practice, investigation of forms of expression involving narrative, performance, installation. Hybrid art forms introduced by Dada movement in 1920's, continued by Fluxus movement in 1950's, to contemporary performance/installation artists.

ArtS 3307. Sculpture: Traditional Approaches. (4 cr. Prereq–1001, 1301)
Clay modeling of human figure, other forms. Mold-making, plaster casting with historical/contemporary systems. Studio practice, investigation of traditional sculptural methods/concepts.

ArtS 3401W. Critical Theories and Their Construction From a Studio Perspective. (3 cr. Prereq–1001, jr, or #)
Primary critical theories that shape the analysis of works of art. Evaluation of works from the artist's perspective. Theory as an organizational structure from which to understand contemporary works.

ArtS 3402. Artists' Books. (4 cr. Prereq–1001, one visual art course)
Study/creation of unique, handmade books using various structures, media, techniques. Critical, historical, theoretical issues surrounding contemporary book arts.

ArtS 3403. Women's Images and Images of Women. (3 cr. Prereq–1001 or #)
Women's place in Western art from the artist's perspective. Women as artists and the imagery they have created. Women as the object of imagery and the social and political attitudes those images convey. Survey of women artists from late-Renaissance through contemporary feminism; relevant issues.

ArtS 3411H. Honors Tutorial in Visual Arts. (1-4 cr [max 6 cr]; A-F only. Prereq–Honors, #)
Individual consultation with a faculty member on visual work, research project, presentation, paper, or bibliography.

ArtS 3415H. Honors Exhibition. (2 cr; A-F only. Prereq–Magna or Summa Honors candidate, #, Δ)
Advanced problems in studio and research, leading to a magna or summa exhibition.

ArtS 3416H. Honors Thesis. (1 cr; A-F only. Prereq–Summa level honors candidate, #)
Summa thesis paper written in support of honors exhibition or in relation to candidate's visual/conceptual interests.

ArtS 3444. Major Project. (1 cr; S-N only. Prereq–#)
Individually designed independent project or exhibition.

ArtS 3496. Internship in the Arts. (1-4 cr. Prereq–Art major, #, Δ)
Field work at local, regional, national, or international arts organization or with professional artist provides experience in activities/administration of art/art-based organizations.

ArtS 3499. Internship at Katherine E Nash Gallery. (3 cr; S-N only. Prereq–1001, #)
Hands-on experience in day-to-day operation/mission of Department of Art's professional gallery.

ArtS 3501. Printmaking: Intaglio and Screen. (4 cr. Prereq–1001, 1501)
In-depth investigation of intaglio/screenprinting. Application of traditional/contemporary techniques. Emphasizes individual artistic expression. Review of historical/cultural development of the media.

ArtS 3502. Printmaking: Relief and Lithography. (4 cr. Prereq–1001, 1501)
Expressive/formal aesthetics of woodcut relief, hand lithography. Studio practice/investigation of artistic attitudes as exemplified through historical perspectives, traditional/contemporary usages.

ArtS 3505. Papermaking as an Art Form. (4 cr. Prereq–1001, 1505)
Further exploration of Eastern, Western, and sculptural applications of papermaking as an art form. Development of visual vocabulary through experimentation and focused inquiry into historical and contemporary methods.

ArtS 3601. Interactivity: Digital Processes. (4 cr. Prereq–1001, 1601)
Conceptual/aesthetic development of digital/interactive works of art. How Web/screen based applications expand formal/conceptual issues of virtuality, community, agency, and non-linear structure within fine art. Critical theory. History of new media/technologies that can enable individual expression.

ArtS 3602. Time Arts: Video. (4 cr. Prereq–1001, 1601)
Digital/non-linear video processes to explore elements of time, cinematic space, narrative, and montage. Personal aesthetic/conceptual directions. Theory, critical readings about historical/contemporary works in digital media.

ArtS 3603. Time Arts: 2-D Animation. (4 cr. Prereq–1001, 1601)
Experimentation and creating a personal voice with two-dimensional animation. Historical overview and contemporary issues. Creating 2-D animation with digital technologies focusing on vector and layer-based raster animation.

ArtS 3604. Time Arts: 3-D Animation. (4 cr. Prereq–1001, 1601)
Conveying creative ideas visually with three-dimensional animation. Creating virtual objects in virtual spaces moving in time. Modeling objects and spaces, creating textures, lighting, movement, and animating to a sound track.

ArtS 3701. Photography: Silver Processes. (4 cr. Prereq–1001, 1701)
Classical photographic practice, concentrating on camera/darkroom controls. Historical overview of the medium. Conceptual/contemporary approaches to traditional themes.

ArtS 3702. Photography: The Extended Image. (4 cr. Prereq–1001, 1701)
Manipulation of the photo image using various camera and darkroom methods including sequence, multiples, narrative, and book formats. Marking and altering photographic surfaces, applied color, and toning. Use of the photograph in interdisciplinary projects.

ArtS 3703. Photography: Digital Imaging. (4 cr. Prereq–1001, 1701)
Photographic digital imaging in fine arts. Manipulation, computer applications. Editing in photo imaging software.

ArtS 3801. Ceramics: Wheel Throwing. (4 cr. Prereq–1001, 1801)
Expands wheel-throwing skills, develops aesthetic awareness of ceramic forms. Kiln firing, glaze formulation.

ArtS 3802. Ceramics: Handbuilding. (4 cr. Prereq–1001, 1801)
Intermediate handbuilding. Development of abilities, critical awareness. Kiln firing, glaze formulation.

ArtS 3803. Ceramics: Mold Making. (4 cr. Prereq–1001, 1801)
Introduction to plaster mold making for ceramics. Plaster mold fabrication, ceramic production, contemporary methods/concepts. Development of personal visual expression.

ArtS 3804. Neon. (4 cr. Prereq–1001)
Introduction to neon sculpture; investigating materials, methods, concepts, history, and studio procedures. Work with glass tubing, electrical components, mixed media, and installation.

ArtS 5104. The Nature of Abstraction. (4 cr. Prereq–3102 or #)
Exploration of abstraction as concept. Studio practice with attention to developing individual work. Emphasizes understanding topics relevant to abstraction. Approached from discipline of painting, open to various material sensibilities.

ArtS 5105. Advanced Dimensional Painting. (4 cr. Prereq–3105 or #)
Illusionary space applied to sculptural forms. Practical applications of spatial/painterly concepts. Emphasizes critical/visual judgment. Development of cohesive body of work reflecting interaction of two/three dimensions.

ArtS 5106. Advanced Drawing: Interpreting the Site. (4 cr. Prereq–3106 or #)
Search for personal content as inspired by site. Field trips (2/3 of course) to draw or paint from various metropolitan area locations. Interpretations enhanced by experimentation with new marks/symbols.

ArtS 5110. Advanced Drawing. (4 cr [max 12 cr]. Prereq–3101 or 3111 or #)
Developing personal direction in form/content. Various media. Various aesthetic/conceptual approaches.

ArtS 5120. Advanced Painting. (4 cr [max 12 cr]. Prereq–3102 or #)
Developing personal vision/content through painting. Emphasizes critical thinking, self-evaluation, and independent pursuit of ideas.

ArtS 5130. Advanced Painting: Watercolor. (4 cr [max 12 cr]. Prereq–3102 or #)
Expressive/technical possibilities of transparent watercolor. Emphasizes pictorial structure, color relationships, visual expression. Work from still life, nature, life model, imagination.

ArtS 5310. Advanced Sculpture: Direct Metal. (4 cr [max 12 cr]. Prereq–3301 or #)
Direct metal sculpture in steel, other metals. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculpture imagery.

ArtS 5320. Advanced Sculpture: Spatial Problems. (4 cr [max 12 cr]. Prereq–3302 or #)
Sculptural practice outside traditional media/approaches. Installation, theater, public art, architecture as topics for individual investigations into spatial organization.

ArtS 5330. Advanced Sculpture: Metal Casting. (4 cr [max 12 cr]. Prereq–3303 or #)
Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery.

ArtS 5340. Advanced Sculpture: Carving and Construction. (4 cr [max 12 cr]. Prereq–3304)
Carving/construction using wood, other materials. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery.

ArtS 5350. Advanced Sculpture: Kinetics. (4 cr [max 12 cr]. Prereq–3305 or #)
Studio practice in kinetic sculpture. Historical/contemporary methods/concepts of sculpture produced by motion. Development of personal imagery.

ArtS 5360. Advanced Performance Art and Installation. (4 cr [max 12 cr]. Prereq–3306 or #)
Studio practice in performance art and installation; investigation of historical and contemporary methods and concepts of interdisciplinary expression. Development of personal imagery.

ArtS 5370. Advanced Sculpture: Traditional Approaches. (4 cr [max 12 cr]. Prereq–3307 or #)
Clay figure modeling. Mold making using historical/contemporary systems. Casting in semi-permanent materials. Studio practice, traditional sculptural methods/concepts. Development of personal imagery.

ArtS 5400. Seminar: Concepts and Practices in Art. (3 cr [max 6 cr]. Prereq–1001 or #)
Various ideologies, cultural strategies that influence practice/interpretation of art. Emphasizes diversity of viewpoints. Application of issues in developing final BFA exhibition.

ArtS 5402. Artists' Books. (4 cr. Prereq–3402 or #)
Advanced projects in creation of unique, handmade books using various structures, media, techniques. Critical, historical, theoretical issues surrounding contemporary book arts.

ArtS 5403. Women's Images and Images of Women. (3 cr. Prereq–1001 or #)
Women's place in Western art from the artist's perspective. Women as artists and the imagery they have created. Women as the object of imagery and the social and political attitudes those images convey. Survey of women artists from late-Renaissance through contemporary feminism; relevant issues.

ArtS 5405. Visual Narrative Structures. (4 cr. Prereq–[1001, one 1xxx art course] or #)
Visual/verbal investigation of structures of visual narratives. Contemporary efforts to integrate cogent images in visual texts. Development of methods for personal visual communication of cultural, spiritual, aesthetic, environmental experiences. Historical/cultural focuses. Studio work.

ArtS 5441. Professional Practices. (3 cr. Prereq–Grad or #)
Intensive writing seminar provides a context for theoretical issues, business practices, and professional skills required for career management and development in the visual arts.

ArtS 5490. Workshop in Art. (1-4 cr [max 12 cr])
Selected topics and intensive studio activity. Topics vary yearly.

ArtS 5510. Advanced Printmaking: Intaglio and Screen. (4 cr [max 12 cr]. Prereq–3501 or #)
In-depth research of intaglio, screen printing. Historical/contemporary applications. Development of imagery using color, photo-mechanical, digital processes. Cross-media approaches.

ArtS 5520. Advanced Printmaking: Relief and Lithography. (4 cr [max 12 cr]. Prereq–3502 or #)
Relief printing, lithography for creative expression. Studio practice with stone, metal, wood. Developing personal visual language/aesthetics. Historical/contemporary awareness, evolving technologies/strategies.

ArtS 5550. Advanced Papermaking. (4 cr [max 12 cr]. Prereq–3505 or #)
Distinct expressive qualities of handmade paper, its versatility as contemporary art form. Independent research pursued in consultation with instructor.

ArtS 5610. Interactivity: Advanced Digital Processes. (4 cr [max 12 cr]. Prereq–3601 or #)
Web-/screen-based and installation/performance projects in consultation with instructor. Focuses on individual expression, role of artists/audience, and synthesis of artistic form/content using interactive digital technologies.

ArtS 5620. Time Arts: Advanced Video. (4 cr [max 12 cr]. Prereq–3602)
Individual projects exploring elements of time, cinematic space, narrative, and montage through experimental, documentary, or installation-based video art. Articulation of relationships between conceptual, aesthetic, and artistic process.

ArtS 5630. Time Arts: Advanced 2-D Animation. (4 cr [max 12 cr]. Prereq–3603 or #)
Individual projects and further development of a personal voice and critical thinking in time-based art. Creating digital 2-D animation with emphasis on vector and layer-based raster animation techniques. Compositing 2-D animation with video.

ArtS 5640. Time Arts: Advanced 3-D Animation. (4 cr [max 12 cr]. Prereq–3604 or #)
Advanced exploration of modeled objects in modeled space and time. Compositing of animated images with video images. Individual projects, expansion of personal voice and visual clarity within the framework of 3-D imagery and time-based artwork.

ArtS 5710. Advanced Photography. (4 cr [max 12 cr]. Prereq–Two sem of 3xxx photography or #)
Design/implementation of individual advanced projects. Demonstrations, lectures, critique. Reading, writing, discussion of related articles/exhibitions.

ArtS 5810. Advanced Ceramics. (4 cr [max 12 cr]. Prereq–3801, 3802 or #)
Critical discourse of aesthetics, history, and contemporary issues in clay and criticism. Independent, advanced projects.

ArtS 5821. Ceramic Materials Analysis. (4 cr. Prereq–3801 or 3802 or #)
Ceramic materials, their interrelationships. Advanced investigation of glazes, slip formulation, clay bodies in high/low temperature ranges. Individual interests related to students' aesthetic needs.

ArtS 5830. Advanced Ceramics: Mold Making. (4 cr [max 12 cr]. Prereq–3803 or #)
Advanced mold making for ceramics. Plaster mold fabrication, ceramic production, contemporary methods/concepts. Development of personal visual expression.

ArtS 5840. Advanced Neon. (4 cr [max 12 cr]. Prereq–3804 or #)
Emphasis on the development of personal sculptural sensibility. Studio practice with neon glass tubing and electrical components. A mixed media approach is encouraged.

ArtS 5990. Independent Study in Art. (1-4 cr [max 12 cr]. Prereq–Major, #)
Independent study project designed by student in consultation with instructor.

Art History (ArtH)

Department of Art History

College of Liberal Arts

ArtH 1001. Introduction to Art History. (4 cr)
History of art examined through selected monuments of major periods, from Paleolithic to modern times. Covers Western, other cultures.

ArtH 1004V. Honors: Introduction to Asian Art. (4 cr. §1016W, §1016V, §1004W. Prereq–Permission of CLA honors adviser)
Issues/themes of South Asian, Southeast Asian, East Asian art from earliest times to present.

For definitions of course numbers, symbols, and abbreviations, see page 296.

ArtH 1004W. Introduction to Asian Art. (4 cr. §1004V, §1016W, §1016V)
Issues/themes of South Asian, Southeast Asian, and East Asian art from earliest times to present.

ArtH 1043. Classical Archaeology: Introduction to the Archaeology of Ancient Greece and Rome. (4 cr)
Role that material culture, including art and architecture, plays in forming our picture of the classical past. Relationship between archaeology and other disciplines that study the past. Study of selected sites considers motives and methods of research, and how the results are used by archaeologists and the general public.

ArtH 1903. Topics: Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule.*

ArtH 1921W. Introduction to Film Study. (4 cr. §CSCL 1921)
Fundamentals of film language, major theories of cinema. Detailed analysis of several films, including John Ford's Stagecoach, Jean-Luc Godard's Breathless.

ArtH 3005. American Art. (4 cr)
Survey of American art from colonial to the present with special emphasis on the relationship of painting, sculpture, the decorative arts, architecture, costume, and material culture to current interpretations of American history.

ArtH 3008. History of Ancient Art. (4 cr)
Architecture, sculpture, and painting of selected early cultures; emphasis on influences contributing to the development of Western art.

ArtH 3009. History of Medieval Art. (4 cr)
Emphasis on principal monuments, their decoration and function (e.g. Old St. Peter's, Rome; Hagia Sophia, Istanbul; Palace Chapel, Aachen; St. Sernin, Toulouse; Cathedral of Chartres, Paris, Rheims).

ArtH 3011W. History of Renaissance and Baroque Art. (4 cr)
Major architects, sculptors, and painters in Western Europe from the 15th through the 18th centuries (e.g. Brunelleschi, Michelangelo, Raphael, Leonardo, Caravaggio, Bernini, Rembrandt, Rubens, Poussin, Watteau).

ArtH 3012. History of 19th- and 20th-Century Art. (3 cr)
Major monuments and issues of modern period: sculpture, architecture, painting, and prints. Movements include neo-classicism, romanticism, realism, impressionism, evolution of modernism, symbolism, fauvism, cubism, dadaism, surrealism, abstract expressionism, pop art, conceptualism, and post-modernism.

ArtH 3013. Introduction to East Asian Art. (3 cr)
A selective examination of works of art produced in China, Korea and Japan from the neolithic era to modern times. Nearly every major type of object and all major styles are represented.

ArtH 3014W. Art of India. (4 cr)
Indian sculpture, architecture, and painting from the prehistoric Indus Valley civilization to the present day.

ArtH 3015W. Art of Islam. (4 cr)
Architecture, painting, and other arts from Islam's origins to the 20th century. Cultural and political settings as well as themes that unify the diverse artistic styles of Islamic art will be considered.

ArtH 3017. Islamic Culture. (4 cr)
Emphasis on visual arts and literature produced by the Muslim world from Spain to the Indian sub-continent. Analysis of original visual and literary sources will form the basis for understanding diverse cultural developments.

ArtH 3035. Classical Myth in Western Art. (4 cr)
An exploration of the role of myth in the visual arts through examination of major figures and stories that became popular in the ancient world and have fascinated artists and audiences ever since.

ArtH 3142. Art of Egypt. (4 cr)
Arts and architecture of Egypt from prehistoric times to the emergence of modern Egypt, with emphasis on elements of continuity and change that have shaped Egyptian culture.

ArtH 3152. Art and Archaeology of Ancient Greece. (4 cr)
Introduction to the civilization of ancient Greece through art and material culture. Case studies of selected monuments and sites.

ArtH 3162. Roman Art and Archaeology. (4 cr)
Introduction to the art and material culture of the Roman World: origins, changes and continuities, "progress" or "decay" in the later Empire, legacy to the modern world.

ArtH 3201. The Olympic Games. (3 cr)
Surveys the Olympic Games (776 B.C. to A.D. 338) and other ancient athletic festivals, including those for women participants. Greek art and literature serve as basic sources. Comparisons are made with modern athletic events.

ArtH 3303. 17th- and 18th-Century Painting in France. (4 cr)
Survey of French painting from Baroque through beginnings of Neo-Classicism (e.g., De la Tour, Le Nain, Vouet, Poussin, Watteau, Boucher, Chardin, David).

ArtH 3422. History of Graphic Arts: 1780 to 1980. (4 cr)
History and theory of the creation of lithography, social caricature (e.g., Daumier, Gavarni), the revival of etching (e.g., Goya and mid-century practitioners, Whistler), and color lithography (e.g., Toulouse-Lautrec, Vuillard, Bonnard). Media changes of 20th century; the revolutionary nature of new media.

ArtH 3464. Art Since 1945. (4 cr)
Broad chronological overview of U.S./international art movements since 1945. Assessment of critical writings by major theoreticians (e.g., Clement Greenberg) associated with those movements. Theoretical perspective of postmodernism.

ArtH 3484. The Art of Picasso and the Modern Movement. (4 cr)
Works of Picasso in all media. Blue, Rose, Cubist, Classical, and later periods of Picasso's development against innovations in media; collage, utilization of found-objects, printmaking and ceramics. Autobiographical nature of imagery gives methodological basis for exploring frequently personalized themes.

ArtH 3575. The Art of Walt Disney in American Culture. (4 cr)
Walt Disney, his companies, and the influence of their products on 20th century American culture. Animation, architecture, city planning, the relationship between the fine arts and popular culture, and the creation of art under industrial conditions of collaboration and profit.

ArtH 3576. American Popular Culture. (3 cr)
American popular culture in the l9th and 20th centuries; fashion, greeting cards, holiday celebration, public spectacle, magazine covers, and commercial design.

ArtH 3578. Arts in Africa. (4 cr)
Surveys the diverse arts of Africa, from antiquity to present. Introduces visual arts of several civilizations and their relation to larger cultural issues (e.g., religion, cosmology, gender, identity, political power).

ArtH 3588. Architecture of Africa, Pre-Colonial to Present. (4 cr)
Introduces the history of architecture in West Africa, from eighth century to present. From the prosperity of early empires of Western Sudan (Ghana, Mali, Songhai), and the impact of Islam on traditional architecture, to colonial/post-colonial architecture.

ArtH 3921W. Art of the Film. (4 cr)
History of the motion picture as an art form; major films, directors, genres, and styles. Films discussed include *The Birth of a Nation*, *Citizen Kane*, *Bicycle Thief*, *Rashomon*, and *Jules and Jim.*

ArtH 3927. Documentary Cinema. (4 cr)
History of nonfiction filmmaking, from early forms of reportage and birth of documentary to emergence of "film-verite" and "guerrilla television" and work by independents (e.g., Errol Morris, Michael Moore).

ArtH 3930. Junior-Senior Seminar. (3 cr; A-F only. Prereq–[Jr or sr] ArtH major, #)
Major art-historical theme, artist, period, or genre. Topics specified in *Class Schedule.*

ArtH 3930H. Honors: Junior-Senior Seminar. (3 cr; A-F only. Prereq–Honors [jr or sr] ArtH major)
Major art-historical theme, artist, period, or genre.

ArtH 3940. Topics in Art History. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule.*

ArtH 3971V. Honors: Major Project. (1 cr; A-F only. Prereq–Honors ArtH major, #)
Completion of research paper begun in a 5xxx course.

ArtH 3971W. Major Project. (1 cr; A-F only. Prereq–ArtH major, #)
Completion of research paper begun in a 5xxx course.

ArtH 3975. Directed Museum Experience. (1-2 cr; S-N only. Prereq–#)
Internship or docentship in an approved program in an art institution or museum. Open to both majors and nonmajors. Must consult with director of undergraduate studies.

ArtH 3993. Directed Study. (1-4 cr [max 12 cr]; A-F only. Prereq–#)

ArtH 3994. Directed Research. (1-4 cr [max 12 cr]; A-F only. Prereq–#)

ArtH 5101. Myths in Art: Cross-Cultural Comparison. (3 cr; A-F only)
Relationships of text/image, efficacy of each in conveying meaning. Properties of visual/verbal communication. Ways in which artists convey mythological meanings, how much these ways differ according to place/time. Students prepare/critique visual presentations through Web pages.

ArtH 5103. Hellenistic and Early Roman Art and Archaeology. (3 cr. Prereq–Clas/ArtH 3008, jr or #)
Sculpture, architecture, painting, and topography in developing centers of Hellenistic culture in the eastern Mediterranean, and in Etruscan and Roman towns from 400 B.C. to the beginnings of the Roman Empire.

ArtH 5108. Greek Architecture. (3 cr. Prereq–ArtH/Clas 3008, jr or sr or grad, or #)
Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Asia Minor, and Italy.

ArtH 5111. Prehistoric Art and Archaeology of Greece. (3 cr. Prereq–Jr or sr or grad student, Greek art/archaeology course or #)
Artistic and architectural forms of Neolithic period in Aegean area and Cycladic, Minoan, and Mycenaean cultures. Aims and methods of modern field archaeology; the record of human habitation in the Aegean area. Archaeological evidence as a basis for historical reconstruction.

ArtH 5112. Archaic and Classical Greek Art. (3 cr. Prereq–Jr or sr or grad or #)
Sculpture, painting, architecture, and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture; archaeological problems such as identifying and dating buildings; analysis of methods and techniques.

ArtH 5120. Field Research in Archaeology. (3-6 cr [max 6 cr]. Prereq–#)
Field excavation, survey, and research at archaeological sites in the Mediterranean area. Techniques of excavation and exploration; interpretation of archaeological materials.

ArtH 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr. Prereq–Intro art history course or #)
The architecture, painting, and sculpture of urban houses, country estates, and tombs in the Roman World. Relationships between public and private spheres, and literary and physical evidence; usefulness of physical evidence in illuminating gender roles.

ArtH 5182. Art and the State: Public Art in the Roman Empire. (3 cr. Prereq–Intro art history course or #)
Origins of Roman public art; use in maintaining community; exploitation by the first Emperor, Augustus; development and diffusion through the later Empire; varying capabilities to adjust to the demands of a Christian Empire.

ArtH 5234. Gothic Sculpture. (3 cr. Prereq–Jr or sr or grad or #)
The origin, character, and development of Gothic sculpture in France, the German empire, and the Netherlands, 1150-1400. Emphasis on French sculpture of the cathedral age and the emergence of a court style in Paris and elsewhere in Europe (e.g. London, Prague).

ArtH 5252. History of Early Christian Art in Context. (3-4 cr. Prereq–3xxx ArtH course or #)
The role played by art in the formation of early Christian and Byzantine communities, and in establishing their relationships with the Pagan world and early Islam.

ArtH 5323. Art of the Italian Renaissance: 14th-16th Centuries. (3 cr)
Chronological/thematic study of painting, sculpture, and architecture. Emphasizes major artists/commissions, but lesser schools/followers also considered.

ArtH 5324. 15th-Century Painting in Northern Europe. (3 cr. Prereq–Jr or sr or grad or #)
The origin, character, and development of painting in France, the Netherlandish area, and the German Empire during the years 1350 to 1500. Emphasis on the Flemish school (e.g., Van Eyck brothers, Campin, Van der Weyden) and its influences.

ArtH 5346. 17th- and 18th-Century Art of Southern Europe. (3 cr. Prereq–3011 or grad or #)
17th-century painting in Spain (e.g., Ribera, Velazquez, Murillo); 17th- and 18th-century architecture, sculpture, and painting in Italy (e.g., Caravaggio, Carracci, Bernini, Algardi, Borromini, Piranesi).

ArtH 5347. 17th- and 18th-Century Art of Northern Europe. (3 cr. Prereq–3011 or grad student or #)
Seventeenth-century painting in Holland/Belgium (e.g., Rembrandt, Rubens). Seventeenth- and eighteenth-century French architecture, sculpture, and painting (e.g., Versailles, Poussin, Watteau).

ArtH 5417. Twentieth Century Theory and Criticism. (3 cr. Prereq–3464 or #)
Trends in 20th-century art theory, historical methodology, criticism. Key philosophical ideas of modernism/postmodernism: formalism, semiotics, poststructuralism, feminism, Marxism, psychoanalysis, deconstruction.

ArtH 5431. Age of Revolution: French Painting 1789 to 1870. (3 cr)
Major issues and movements in France and leading practitioners: neo-classicism-David; romanticism-Corot, Gericault, Delacroix; landscape and peasant painting-the Barbizon group; realism-Courbet; pre-Impressionism-Monet, Manet, Pissarro. Movements linked with historical changes emphasizing contextualization of monuments.

ArtH 5454. Design Reform in the Era of Art Nouveau. (3 cr)
History of art nouveau in France, Belgium, England, Germany, Austria, Scotland, United States. Innovations in architecture, graphics, decorative arts; continental variants of the style. Major promoters and pioneers of modern design. Critical issues of design reform; texts integrated with principal monuments.

ArtH 5463. Early 20th-Century Painting and Sculpture. (3 cr)
Primary movements of early 20th century: fauvism, German expressionism, cubism, futurism, dadaism, surrealism, non-objective painting, constructivism, Orphism, early abstraction. Framed against postimpressionism and internationalism at turn of century.

ArtH 5465. American Sculpture: The Public Monument. (3 cr)
Case studies in American public sculpture of the l9th and 20th centuries including the l893 Chicago Fair, the Iwo Jima and Vietnam Veterans Memorials, the Washington Monument, the Lincoln Memorial; careers of Daniel Chester French and Augustus St. Gaudens.

ArtH 5466. Contemporary Art. (3 cr. Prereq–3464 or #)
Survey of the art and important critical literature of the period after 1970. Origins and full development of postmodern and subsequent aesthetic philosophies.

ArtH 5521. Modernism and Modernity in American Painting: 1876 to 1945. (3 cr)
Relationship between modernity and "modernism" in the visual arts between the Centennial Exposition of 1876 and World War II. Artists addressed include the Ash Can School and the Regionalists.

ArtH 5535. Style, Tradition, and Social Content in American Painting: Colonial Era to 1876. (3 cr)
America's colonial, Revolutionary era, and 19th-century painters' responses to the influence of European aesthetics. Key American painting types: portraiture, rural genre, and landscape from Copley and Gilbert Stuart to the Hudson River School and the chroniclers of the Western frontier.

ArtH 5536. Topical Studies in American Art. (3 cr)
Course description varies from year to year, depending on the current research interests of the instructor and the needs and interests of advanced undergraduate and graduate students in modern and American art.

ArtH 5546. American Architecture: 1840 to 1914. (3 cr)
American architecture from 1840 to 1914, examined in relation to European precedents and American sociohistorical conditions. Critical attention to problems of style, the architectural profession, vernacular vs. "high" architecture, technology, economics, urbanism, and social reform.

ArtH 5725. Ceramics in the Far East. (3 cr)
Selective examination of representative pottery and ceramic wares produced in China, Korea, and Japan from the Neolithic era to modern times. Nearly every major ceramic type is represented.

ArtH 5765. Early Chinese Art. (3 cr)
Develop a more effective way to understand the unique qualities of an individual work of art. Concentration is on accessible works of art in local private and museum collections.

ArtH 5766. Chinese Painting. (3 cr)
Major works from the late bronze age to the modern era that illustrate the development of Chinese landscape painting and associated literary traditions.

ArtH 5767. Japanese Painting. (3 cr)
Japanese pictorial arts from the late tomb period to the modern era; special attention to the development of indigenous traditions.

ArtH 5769. Connoisseurship in Asian Art. (3 cr)
A selective examination of representative works of art produced in China from the Neolithic era to the Han Dynasty. Major archaeological sites and examples of art in local collections.

ArtH 5775. Formation of Indian Art: 2500 B.C.E. to 300 C.E. (3 cr. Prereq–Art history course or #)
Sculpture and architecture from the Indus Valley civilization through the Kushana period.

ArtH 5776. Redefining Tradition: Indian Art 400 to 1300. (3 cr. Prereq–Art history course or #)
An examination of India's art and architecture from the time of the earliest free-standing temples through the 13th century, focusing on temples and their associated sculpture, mural painting, and the beginnings of Islamic architecture in India.

ArtH 5777. The Diversity of Traditions: Indian Art 1200 to Present. (3 cr. Prereq–Art history course or #)
Issues presented by sculpture, architecture and painting in India from the prehistoric Indus Valley civilization to the present day.

ArtH 5781. Age of Empire: The Mughals, Safavids, and Ottomans. (3 cr)
Artistic developments under the three most powerful Islamic empires of the 16th through 19th centuries: Ottomans of Turkey; Safavids of Iran; Mughals of India. Roles of religion and state will be considered to understand their artistic production.

ArtH 5785. Art of Islamic Iran. (3 cr)
Architecture, painting, and related arts in Iran from the inception of Islam (7th century) through the 20th century. Understanding the nature of Islam in Persianate cultural settings and how artistic production here compares to the Islamic world.

ArtH 5925. History of Photography as Art. (3 cr)
Origins and development of photography, with attention to technology and cultural impact. Major aesthetic achievements in photography from its beginning to present.

ArtH 5927. Documentary Cinema. (4 cr; A-F only)
History of nonfiction filmmaking, from early forms of reportage and birth of documentary to emergence of "film-verite" and "guerrilla television" and work by independents (e.g., Errol Morris, Michael Moore).

ArtH 5940. Topics: Art of the Film. (3-4 cr)
Topics in film history including individual directors (e.g., Hitchcock, Welles), genres (e.g., westerns, musicals), and other topics (e.g., American independent filmmaking, film noir).

ArtH 5950. Topics: Art History. (2 4 cr [max 12 cr])
Topics specified in *Class Schedule*.

ArtH 5960. Topics: Art History. (3 cr [max 6 cr])
Topics specified in *Class Schedule*.

ArtH 5993. Directed Study. (1-4 cr [max 12 cr]; A-F only. Prereq–#)

ArtH 5994. Directed Research. (1-4 cr [max 12 cr]; A-F only. Prereq–#)

Asian Languages and Literatures (ALL)

Department of Asian Languages and Literatures

College of Liberal Arts

ALL 1904. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule* and *Course Guide*.

ALL 1905. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule* and *Course Guide*.

ALL 1909W. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule* and *Course Guide*.

ALL 1910W. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule* and *Course Guide*.

ALL 3110. Study of an Asian Language. (1-5 cr [max 10 cr]. Prereq–Δ)
Study of an Asian language in another country or at other non-campus locations. Students study in situations complementary to regular University course offerings.

ALL 3720. Study Abroad Topics in Asian Culture. (1-4 cr [max 12 cr]; A-F only)
Part of University of Minnesota sponsored study abroad experience.

ALL 3900. Topics in Asian Literature. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule*.

ALL 3920. Topics in Asian Culture. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule*.

ALL 4900W. Major Project. (1 cr; A-F only. Prereq–[ALL major, sr, #])
Directed research/writing on topic selected according to individual interest and in consultation with faculty adviser.

Astronomy (Ast)

Department of Astronomy

Institute of Technology

Ast 1001. Exploring the Universe. (4 cr. §1011)
The human place in the Universe. Study of Earth, other planets, sun, stars, galaxies. Background and fragility of life on Earth. Scale, origin, history of universe and our relationship to it.

Ast 1004. Mathematics and Our Universe. (3 cr)
Selected topics in astronomy. Introduction to how basic mathematical concepts and reasoning further our understanding of the universe.

Ast 1005. Descriptive Astronomy. (3 cr. §1001, §1011H. Prereq–Non-science major)
Twentieth century astrophysics, current frontiers of astrophysical research.

Ast 1011H. Exploring the Universe, Honors. (4 cr. §1001. Prereq–High school trigonometry, high school physics or chemistry)
The human place in the universe. Study of Earth, other planets, sun, stars, galaxies. Background and fragility of life on Earth. Scale, origin, history of universe and our relationship to it. Honors version of Ast 1001.

Ast 1019. Our Changing Planet. (4 cr. §Geo 1019, §EEB 1019)
Interdisciplinary study of Earth as a set of interacting, evolving systems—solid Earth, oceans, atmosphere, and biosphere—and its relationship with the sun and stars. Cycling of matter and energy in Earth systems, their equilibria, and the effect of natural and human perturbations.

Ast 1901. Freshman Seminar. (1-3 cr)
Topics vary. See *Class Schedule*.

Ast 1905. Freshman Seminar. (1-3 cr)
Topics vary. See *Class Schedule*.

Ast 1910W. Freshman Seminar, Writing Intensive. (1-3 cr. Prereq–Fr with no more than 24 cr)
Topics vary. See *Class Schedule*.

Ast 2001. Introduction to Astrophysics. (4 cr. Prereq–1 yr calculus, Phys 2303 or #)
Physical principles and study of solar system, stars, galaxy, universe. How observations and conclusions are made.

Ast 2990. Directed Studies. (1-5 cr. Prereq–1 yr calculus, Phys 1302, #)
Independent, directed study in observational and theoretical astrophysics. Arranged with faculty member.

Ast 4011. Stars and Stellar Evolution. (4 cr. Prereq–2001, Phys 2601 or #)
Survey of stars and stellar evolution. Stellar atmospheres and interiors. Evolution of single stars, White dwarfs, neutron stars, black holes. Formation of stars.

Ast 4021. Galaxies and the Milky Way. (4 cr. Prereq–2001, Phys 2601 or #)
Survey of structure, kinematics; evolution of the Milky Way, external galaxies, their constituents. Emphasizes observed properties of galaxies.

Ast 4101. Computational Methods in the Physical Sciences. (4 cr. Prereq–Upper div CLA or upper div IT or grad or #)
Introduction to using computer programs to solve problems in physical sciences. Selected numerical methods, mapping problems onto computational algorithms. Arranged lab.

Ast 4299H. Senior Honors Astrophysics Research Seminar. (1 cr. Prereq–[Upper div honors student in IT or CLA], #)
Based on department's research seminar.

Ast 4990. Directed Studies. (1-5 cr. Prereq–2001, #)
Independent, directed study in observational and theoretical astrophysics. Arranged with faculty member.

Ast 4994W. Directed Research. (3-5 cr. Prereq–#)
Independent research in observational or theoretical astrophysics. Senior Thesis for undergraduate astrophysics majors. Arranged with faculty member.

Ast 5012. The Interstellar Medium. (4 cr. Prereq–2001, Phys 2601 or #)
Survey of physical processes in the interstellar medium. Dynamic processes, excitation processes, emission and absorption by gas and dust. Hot bubbles, HII regions, molecular clouds.

Ast 5022. Relativity, Cosmology, and the Universe. (4 cr. §Phys 5022. Prereq–[2001, Phys 2601] or #)
Large-scale structure/history of universe. Introduction to Newtonian/relativistic world models. Physics of early universe, cosmological tests, formation of galaxies.

Ast 5201. Methods of Experimental Astrophysics. (4 cr. Prereq–Upper div IT or grad or #)
Contemporary astronomical techniques and instrumentation. Emphasizes data reduction and analysis, including image processing. Students make astronomical observations at O'Brien Observatory and use department's computing facilities for data analysis. Image processing packages include IRAF, AIPS, IDL, MIRA.

Biochemistry (BioC)

Department of Biochemistry

College of Biological Sciences

BioC 1001. Elementary Biochemistry. (3 cr. Prereq–High school chem or college general chem)
Chemistry and biochemistry as they apply to the organization, function, and regulation of living systems, especially humans. Suitable for undergraduates who desire an introduction to biochemistry including students in health science programs such as dental hygiene or occupational therapy.

BioC 2011. Biochemistry for the Agricultural and Health Sciences. (3 cr. §1012, §3001. Prereq–Chem 1011, Biol 1009; not for biology majors)
Survey of organic chemistry/biochemistry outlining structure/metabolism of biomolecules, metabolic regulation, and principles of molecular biology.

BioC 3021. Biochemistry. (3 cr. §Biol 3021. Prereq–Biol 1002 or 1009, Chem 2301)
Fundamentals of biochemistry including structure and function of proteins, nucleic acids, lipids and carbohydrates; metabolism and regulation of metabolism; quantitative treatments of chemical equilibria, enzyme catalysis and bioenergetics; the chemical basis of genetic information flow.

BioC 3960. Research Topics in Biochemistry. (1 cr [max 2 cr]; S-N only)
Lectures, discussion on current research in the department.

BioC 4001. Biochemistry for Medical Technology. (3 cr. Prereq–[General chem, organic chem] or #)
Chemical properties, biosynthesis, catabolism, structure/function of biomolecules. Fundamental aspects of molecular biology/metabolic regulation.

BioC 4002. Physiological Biochemistry of Human Systems. (2 cr. Prereq–[[3021 or 4001], Biol 3021] or #)
Physiological biochemistry. Emphasizes processes occurring in humans.

BioC 4025. Laboratory in Biochemistry. (2 cr. Prereq–3021 or 4331 or Biol 3021)
Theory, principles, and practical use of fundamental techniques in modern biochemistry laboratories.

BioC 4125. Laboratory in Molecular Biology and Biotechnology. (3 cr; A-F only. §4185, §Biol 4125, §Biol 4185. Prereq–[3021 or Biol 3021 or Biol 4003], [4025 or GCD 4015 or GCD 4025 or MicB 3301])
Basic recombinant DNA techniques: methods for growing, isolating, and purifying recombinant DNA and cloning vectors, DNA sequencing and sequence analysis, gene expression, Polymerase Chain Reaction (PCR), other current techniques.

BioC 4185. Laboratory in Molecular Biology and Biotechnology. (3 cr; A-F only. §4125, §Biol 4125, §Biol 4185. Prereq–[biochemistry or genetics course], [intermed-level lab in biochem or genetics or cell biol or microbiol], enrollment in Summer Undergraduate Research Program in Life Sciences)
Basic recombinant DNA techniques: methods for growing, isolating, and purifying recombinant DNA and cloning vectors, DNA sequencing and sequence analysis, gene expression, Polymerase Chain Reaction (PCR), other current techniques.

BioC 4331. Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems. (4 cr. Prereq–[Biol 1002 or 1009], Chem 2302)
Advanced survey of structure/catalysis, metabolism/bioenergetics.

BioC 4332. Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression. (4 cr. Prereq–4331 or #)
Advanced survey of molecular biology, mechanisms of gene action, and biological regulation.

BioC 4418. Topics in Molecular Immunology. (3 cr; A-F only. Prereq–MicB 4131 or #)
Molecular interactions occurring among proteins and peptides involved in immune recognition.

BioC 4521. Introduction to Physical Biochemistry. (3 cr. Prereq–Chem 1022, Math 1272, Phys 1202)
Introduction to physical chemical principles and their applications in biochemistry. Thermodynamics, kinetics, spectroscopy, and solution dynamics as applied to biochemical reactions and biopolymers.

BioC 4793W. Directed Studies: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Individual study on selected topics or problems. Emphasizes readings, use of scientific literature. Written report.

BioC 4794W. Directed Research: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Laboratory or field investigation of selected areas of research, including written report.

BioC 4993. Directed Studies. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature.

BioC 4994. Directed Research. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Laboratory or field investigation of selected areas of research.

BioC 5001. Biochemistry, Molecular and Cellular Biology. (5 cr. §6001. Prereq–Undergrad course in biochemistry, #)
Integrated course in biochemistry, molecular biology, cell biology, and developmental biology.

BioC 5309. Biocatalysis and Biodegradation. (3 cr. §MicE 5309. Prereq–Chemistry through organic chemistry; knowledge of word processing, e-mail, access to World Wide Web, access to college-level science library recommended)
Assess validity of information on biocatalysis and biodegradation; learn fundamentals of microbial catabolic metabolism as it pertains to biodegradation of environmental pollutants; biocatalysis for specialty chemical synthesis; display of this information on the Web.

BioC 5352. Applied Microbial Biochemistry. (3 cr. §MicB 5352. Prereq–Biol/BioC 3021 or BioC 4331 or MicB 4111, MicB 3301 or Biol 3301 or #)
Biochemistry of microorganisms and enzymes of industrial interest. Heterologous peptide overproduction by microorganisms and yeasts; polymer, antibiotic, organic acid, and amino acid

production; genetics of industrially useful microorganisms; biological systems useful for biotransformation and environmental remediation; introduction to fermentation technology.

BioC 5361. Microbial Genomics and Bioinformatics. (3 cr. Prereq–College-level courses in [organic chemistry, biochemistry, microbiology])
Introduction to genomics. Emphasizes microbial genomics. Sequencing methods, sequence analysis, genomics databases, genome mapping, prokaryotic horizontal gene transfer, genomics in biotechnology, intellectual property issues.

BioC 5401W. Advanced Metabolism and Its Regulation. (3 cr. Prereq–3021 or 4331 or Biol 3021)
Underlying principles that determine metabolism of common/unusual compounds in plants, animals, microorganisms. Regulation of carbon, energy flow in whole organisms.

BioC 5444. Muscle. (3 cr. §Phsl 5444. Prereq–Biol/BioC 3021 or BioC 4331 or Phsl 3061 or #)
Muscle structure/function: molecular mechanism by which force is generated.

BioC 5446. Membrane Biochemistry. (2 cr. Prereq–3021 or 4331 or Biol 3021 or #)
Membrane structure. Mechanisms and physiological roles of channels, pumps, and membrane enzymes.

BioC 5527. Introduction to Modern Structural Biology. (4 cr. Prereq–[Intro biochemistry, intro physics] or physical chemistry or #)
Methods employed in modern structural biology to elucidate macromolecular structures. Primary focus on X-ray diffraction, nuclear magnetic resonance (NMR) spectroscopy and mass spectrometry. Principles underlying structural biology and structure/function relationships.

BioC 5528. Spectroscopy and Kinetics. (4 cr. Prereq–Intro physical chemistry or equiv; intro biochemistry recommended)
Biochemical dynamics from perspectives of kinetics and spectroscopy. Influence of structure, molecular interactions, and chemical transformations on biochemical reactions. Focuses on computational, spectroscopic, and physical methods. Steady-state and transient kinetics. Optical and magnetic resonance spectroscopies.

BioC 5530. Selected Topics in Molecular Biophysics. (1-3 cr [max 9 cr]. Prereq–5527 or 5528 or equiv)
Topics from current literature on biophysics of proteins, nucleic acids, muscle, membranes. Content/instructors vary from one offering to another, on an approximately every other year rotation.

BioC 5531. Macromolecular Crystallography I: Fundamentals and Techniques. (1 cr; S-N only. Prereq–[[One organic chemistry or biochemistry course], [two calculus or college physics courses]] or #)
Macromolecular crystallography for protein structure determination/engineering. Determining macromolecule structure by diffraction.

BioC 5532. Macromolecular Crystallography II: Techniques and Applications. (1 cr; S-N only. Prereq–5531)
Determining structure of macromolecule by diffraction. Using software in macromolecular crystallography.

Bioinformatics (BInf)

Department of Laboratory Medicine and Pathology

Medical School

BInf 5490. Topics in Bioinformatics. (1-6 cr [max 12 cr]. Prereq–#)
Independent or group study in bioinformatics.

Biology (Biol)

College of Biological Sciences

Biol 1001. Introductory Biology I: Evolutionary and Ecological Perspectives. (4 cr. §1009)
Biological diversity from genetic variation to diversity of species/ecosystems. Genetic, evolutionary, and ecological processes governing biological diversity. Genetic, evolutionary, and ecological perspectives on issues concerning human diversity, human population growth, health, agriculture, and conservation. Lab.

Biol 1002W. Introductory Biology II: Molecular, Cellular, and Developmental Perspectives. (5 cr; A-F only. §1009. Prereq–[1001 or equiv], Chem 1021)
Chemistry of living things, cell structure/transport, energy processing in cells, introduction to primary metabolism, molecular genetics, cell physiology, cell cycles, principles of animal/plant development, regulation of development. Lab focuses on molecular scientific techniques, investigative designs.

Biol 1009. General Biology. (4 cr. §1001, §1002. Prereq–High school chemistry; 1 term college chemistry recommended)
Major concepts of modern biology. Molecular structure of living things, energy recruitment/utilization, flow of genetic information through organisms/populations. Principles of inheritance, ecology, and evolution. Includes lab.

Biol 1009H. Honors: General Biology. (4 cr. §1001, §1002. Prereq–High school chemistry, honors; one term of college chemistry recommended)
Major concepts of modern biology. Molecular structure of living things, energy recruitment/utilization, flow of genetic information through organisms/populations. Principles of inheritance, ecology, and evolution. Includes lab.

Biol 1020. Biology Colloquium. (1 cr [max 2 cr]; S-N only)
Introduction to the diverse fields of biology through seminars, lab tours, trips to Itasca Biological Station, and interaction with other biology students and faculty. Course may be repeated once.

Biol 1041. Preparation for Graduate Programs in Science. (1 cr; S-N only. Prereq–#)
Necessary elements for excelling in mathematics, physical and biological sciences to prepare for graduate work in science. Required for new freshmen in the Mathematics and Science Tutorial (MST) Program.

Biol 1093. Biology Colloquium: Directed Study. (1 cr; S-N only. Prereq–1020 and ¶1020)
Individual study or research undertaken by a student concurrently enrolled in Biol 1020 with oversight by a faculty sponsor.

Biol 1101W. Heredity and Human Society. (3 cr. Prereq–No cr if taken after 4003 or GCB 3022)
Principles of heredity and their social and cultural implications.

Biol 1901. Freshman Seminar for the Biological Sciences. (1-2 cr; A-F only)
Orientation to University environment. Special topics illustrate importance of biological issues.

Biol 1903. Freshman Seminar for the Biological Sciences. (1-2 cr; A-F only)
Orientation to University environment. Special topics illustrate importance of biological issues.

Biol 1905. Freshman Seminar for the Biological Sciences. (1-2 cr; A-F only)
Orientation to University environment. Special topics that illustrate the importance of biological topics/issues in modern society.

Biol 1910W. Freshman Seminar for the Biological Sciences. (2 cr; A-F only)
Orientation to University environment. Special topics that illustrate the importance of biological topics/issues in modern society. Writing-intensive.

Biol 1981. Intersections of Biology at Lake Itasca. (1 cr; A-F only. Prereq–[45 or fewer cr] or #)
Plant biochemistry, terrestrial ecology, aquatic ecology, ecological genetics, molecular biology. Ten-day course at Lake Itasca Forestry and Biological Station in north central Minnesota. Lab, field work.

Biol 2001. Careers in Biology. (1 cr; S-N only. Prereq–1020)
Exploration of career options in biological sciences. Introduction to career life planning techniques and decision making skills. Interest, aptitude, and skills assessment. Preparation for internship experience.

Biol 2005. Animal Diversity Laboratory. (1 cr. Prereq–credit will not be granted if credit received for: 2012; 3211 or ¶3211)
Dissection and direct observation of representatives of major animal groups.

Biol 2012. General Zoology. (4 cr. §2005. Prereq–1001 or 1009)
Major animal groups (phyla). Applications of morphological, physiological, and developmental characteristics to define evolutionary relationships. Parasitic forms affecting human welfare. Lab requires dissection, including mammals.

Biol 2022. General Botany. (3 cr; A-F only. §2822. Prereq–1001 or 1009)
Principles of plant biology. Organization, function, growth/development, and reproductive biology of plants and plant-like organisms. Lab.

Biol 2032. General Microbiology With Laboratory. (4 cr. §3301, §MicB 2032, §MicB 3301, §VPB 2032. Prereq–[1002 or 1009], Chem 1022; intended primarily for non-microbiology majors)
Fundamental principles of microbiology. Bacterial metabolism, growth, and genetics. Biology of viruses/fungi. Control of microorganisms. Host-microbe interactions. Microorganisms and disease. Applied microbiology. Includes lab.

Biol 2201. Introduction to Computing in Biology. (1 cr; S-N only. Prereq–[1009 or 1002 or equiv], biological sciences major)
Hands-on use of microcomputers to show how computers manipulate data, prepare graphs/graphics, acquire/analyze scientific data, perform literature searches, prepare scientific presentations, communicate via network.

Biol 2822. General Botany. (3 cr; A-F only. §2022. Prereq–[1001 or 1009], Δ)
Principles of plant biology. Organization, function, growth/development, and reproductive biology of plants and plant-like organisms. Lab, field work.

Biol 2960H. Explorations in the Biological Sciences: Honors Colloquium. (1 cr; A-F only. Prereq–CBS honors program, soph, Δ)
Students explore various areas of biological research, interact with scientists and fellow students, and prepare an in-depth review paper.

Biol 3002. Plant Biology: Function. (2 cr. Prereq–1002 or 1009, one sem chemistry with some organic content [e.g., Chem 1011], ¶3005 or ¶Agro 3005 or ¶Hort 3005)
How plants make and use food; mineral function and uptake; water relations; transport processes; growth and development.

Biol 3005W. Plant Function Laboratory. (2 cr. Prereq–¶3002)
Various plant processes at subcellular, organ, whole plant levels. Lab, recitation.

Biol 3007. Plant Biology: Diversity and Adaptation. (4 cr. Prereq–1002 or 1009, Chem 1021)
The evolution and diversity of plants and their adaptations for survival in varied environments. Includes lab.

Biol 3021. Biochemistry. (3 cr. §BioC 3021. Prereq–1002 or 1009, Chem 2301)
Fundamentals of biochemistry including structure and function of proteins, nucleic acids, lipids and carbohydrates, metabolism, and regulation of metabolism; quantitative treatments of chemical equilibria, enzyme catalysis, and bioenergetics; and the chemical basis of genetic information flow.

Biol 3101. Introduction to Neuroscience I: From Molecules to Madness. (3 cr; A-F only. §NSc 3101, §Phsl 3101. Prereq–3021 or BioC 3021 or BioC 4331)
Basic principles of cellular/molecular neurobiology and nervous systems.

Biol 3102W. Introduction to Neuroscience II: Biological Basis of Behavior. (3 cr; A-F only. §NSc 3102, §Phsl 3102, §NSc 3102W. Prereq–3101 or NSc 3101 or Phsl 3101)
Organization of neural systems/subsystems underlying sensory/motor aspects of behavior. Writing intensive.

Biol 3211. Animal Physiology. (3 cr. Prereq–[1002 or 1009], Chem 1021; ¶2005 strongly recommended)
Compares ways different animals solve similar physiological problems.

Biol 3301. Biology of Microorganisms. (5 cr; A-F only. §2032, §MicB 2032, §MicB 3301, §VPB 2032. Prereq–[1002, Chem 2302] or [1009, [3021 or ¶3021 or BioC 3021 or ¶BioC 3021]])
Taxonomy, anatomy, physiology, biochemistry, pathogenesis, immunology, ecology of microbes. Molecular structure in relation to bacterial function and disease. Includes lab.

Biol 3407. Ecology. (3 cr. §3807, §EEB 3001. Prereq–[1001 or 1009 or equiv], [Math 1142 or Math 1271 or equiv])
Principles of population growth/interactions and ecosystem function applied to ecological issues. Regulation of human populations, dynamics/impacts of disease, invasions by exotic organisms, habitat fragmentation, biodiversity. Lab.

Biol 3409. Evolution. (3 cr. Prereq–1002 or 1009)
Diversity of forms in fossil record and in presently existing biology. Genetic mechanisms of evolution. Examples of ongoing evolution in wild/domesticated populations and in disease-causing organisms. Lab.

Biol 3411. Introduction to Animal Behavior. (3 cr. §3811. Prereq–1002 or 1009 or #)
Biological study of animal behavior. Mechanism development, function, and evolution. Emphasizes evolution of adaptive behavior, social behavior in the natural environment. Lab.

Biol 3413. Biological Rhythms and Timing Mechanisms. (3 cr. Prereq–1001 or 1009)
Timing mechanisms and rhythms of organisms in physiological processes, ecological adaptation, and health; current hypotheses concerning their cellular and molecular nature. Individual projects.

Biol 3501. Biology of Cancer. (2 cr. Prereq–Biol 1002 or 1009; not for biology majors)
Biological aspects of etiology, phylogeny, and cellular processes involved in neoplasia. Growth/differentiation of normal/cancer cells. History of cancer research.

Biol 3503. Biology of Aging. (2 cr. Prereq–1002 or 1009)
Age-related changes in individuals/populations. Evolution of senescence. Genes that influence aging. Interventions. Prospects for an aging human society.

Biol 3600. Directed Instruction. (1-2 cr [max 6 cr]; S-N only. Prereq–1020, upper div, application, #; up to 4 cr may apply to major)
Students assist with biology colloquium.

Biol 3610. Internship: Professional Experience in Biological Sciences. (1-6 cr [max 6 cr]; S-N only. Prereq–Acceptance into CBS Professional Learning Experience Program, internship workshop, ❑; up to 4 cr may apply to major)
Matches student's academic or career goals with opportunities in industry, non-profit organizations, and government agencies.

Biol 3700. Undergraduate Seminar. (1 cr [max 3 cr]; S-N only)
Faculty members lead groups of students in discussions on topics of current interest.

Biol 3807. Ecology. (4 cr. §3407. Prereq–[1001 or 1009 or equiv], [Math 1142 or Math 1271 or equiv], Δ)
Principles of population growth/interactions and ecosystem function applied to ecological issues. Regulation of human populations, dynamics/impacts of disease, invasions by exotic organisms, habitat fragmentation, biodiversity. Lab, field work.

Biol 3811. Introduction to Animal Behavior. (3 cr. §3411. Prereq–[1002 or 1009 or #], Δ)
Biological study of animal behavior. Mechanism development, function, and evolution. Emphasizes evolution of adaptive behavior, social behavior in the natural environment. Lab, field work.

Biol 3960. Honors Seminar. (1-2 cr [max 2 cr]; S-N only. Prereq–Limited to participation in CBS honors program, Δ)
Oral reports on topics of current interest to biologists. Progress reports on laboratory and field research by students.

Biol 3960H. Honors Seminar. (1 cr [max 2 cr]; S-N only. Prereq–Limited to participation in CBS honors program, Δ)
Oral reports on topics of current interest to biologists. Progress reports on laboratory and field research by students.

Biol 4003. Genetics. (3 cr. Prereq–Biol/BioC 3021 or BioC 4331)
Introduction to the nature of genetic information, its transmission from parents to offspring, its expression in cells and organisms, and its course in populations.

Biol 4004. Cell Biology. (3 cr. Prereq–Biol/BioC 3021 or BioC 5331, Biol 4003 or BioC 4332)
Processes fundamental to cells emphasizing eukaryotic cells. Assembly and function of membranes and organelles. Cell division, cell form and movement, intercellular communication, transport, and secretion pathways. Some discussion of specialized cells including cancer cells and differentiated cells.

Biol 4105. Neurobiology Laboratory I. (1.5 cr; A-F only. §NSci 3105. Prereq–[3101 or NSci 3101 or Phsl 3101], [3102W or NSci 3102W], #)
Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

Biol 4115. Neurobiology Laboratory II. (1.5 cr; A-F only. §NSci 3115. Prereq–[3102 or NSci 3102 or Phsl 3102], [3102W or NSci 3102W], #)
Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

Biol 4185. Recombinant DNA Laboratory. (3 cr; A-F only. §4125. Prereq–[Biochemistry or genetics course], [intermediate-level lab in biochemistry or genetics or cell biology or microbiology], enrollment in Summer Undergraduate Research Program in Life Sciences, ❑)
Basic recombinant DNA techniques. Methods for growing, isolating, and purifying recombinant DNAs and for cloning vectors.

Biol 4501. Social Uses of Biology. (3 cr. Prereq–7 cr in sciences)
Influence of biological science on the quality of human life: agriculture, medicine, occupational health, environmental science, and theories of human nature. Responsibilities and roles of biologists in policy formulation in the scientific and political world.

Biol 4850. Special Topics in Biology. (1-7 cr [max 7 cr]. Prereq–Δ)
In-depth study of special topic in life sciences. Offered at Lake Itasca Forestry and Biological Station.

Biol 4894. Directed Research at Itasca. (1-7 cr [max 7 cr]; S-N only. Prereq–#,Δ; max of 7 cr of [4894 or 4993 or 4994] may count toward major requirements)
Field investigation of selected areas of research at Itasca Field Station.

Biol 4950. Special Topics in Biology. (1-5 cr [max 10 cr])
In-depth study of a specialized topic in the life sciences

Biol 5407. Ecology. (3 cr. §3407. Prereq–[[1001 or 1009 or equiv], [Math 1142 or Math 1271 or equiv], grad] or #)
Principles of population growth/interactions and ecosystem function applied to ecological issues, including regulation of human populations, dynamics/impacts of disease, invasions by exotic organisms, habitat fragmentation, and biodiversity. Lab.

Biol 5409. Evolution. (3 cr. §3409. Prereq–[[1001 or 1009], grad] or #)
Diversity of forms in fossil record and in presently existing biology. Genetic mechanisms of evolution. Examples of ongoing evolution in wild/domesticated populations and in disease-causing organisms. Lab.

Biol 5501. Biological Collections: Curation and Management. (1 cr. Prereq–2012 or 2022 or 3007 or 3211)
Roles and value of biological collections in terms of biodiversity; natural history museum management and philosophy; conservation of museum specimens; data access and ethics. Students participate in various curatorial activities.

Biol 5511. Teaching the Biological Sciences. (3 cr; A-F only. Prereq–6 cr in the life sciences)
Methods and teaching styles used by outstanding university teachers including reviews and critiques from research on teaching. Opportunities for students to practice and evaluate teaching strategies.

Biol 5910. Special Topics in Biology for Teachers. (1-4 cr [max 12 cr]. Prereq–BA or BS in science or science education or elementary education or K-12 licensed teacher)
Courses developed for K-12 teachers depending on topics or subtopics which might include any of the following: plant biology, animal biology, genetics, cell biology, biochemistry, microbiology.

Biol 5913. Biology for Teachers: Monarchs in the Classroom. (3 cr. Prereq–[[Elementary or middle school or high school or preservice] teacher or #], application)
Two-week summer workshop. Week one focuses on monarch butterfly biology taught through fieldwork, labs, lecture, and research projects. A 2- to 3-week break follows, when students raise monarchs, conduct simple experiments. Week two focuses on designing classroom activities/projects based on monarch biology. Follow-up meetings held during academic year.

Biomedical Engineering (BMEn)

Department of Biomedical Engineering

Institute of Technology

BMEn 2501. Cell and Molecular Biology for Biomedical Engineers. (4 cr; A-F only. Prereq–Biol 1009, Chem 1022, Phys 1302, Math 1372, [IT or Δ])
Fundamentals of cellular/molecular biology. Chemistry of proteins, lipids, and nucleic acids. Applications to biomedical engineering. Function/dynamics of intracellular structures and differentiated animal cells. Emphasizes application of physical/chemical fundamentals to modeling cellular/subcellular processes. Lecture/laboratory.

BMEn 2502. Cell and Molecular Biology Lab. (1 cr; A-F only. Prereq–Biol 1009, Chem 1022, Phys 1302, Math 1372, Δ; not intended for students taking 2501)
Fundamentals of cellular/molecular biology. Chemistry of proteins, lipids, and nucleic acids. Applications to biomedical engineering.

BMEn 2601. Biomedical Engineering Undergraduate Seminar I. (1 cr)
Introduction to biomedical engineering from academic/industrial perspectives. Survey of current/emerging areas.

BMEn 2602. Biomedical Engineering Undergraduate Seminar II. (1 cr. Prereq–2601 or Δ)
Continuation of 2601. Emphasizes biomedical engineering design and numerical analysis.

BMEn 3001. Biomechanics. (4 cr; A-F only. Prereq–Math 2374, Phys 1302, [BME upper div or Δ])
Statics, dynamics, and deformable body mechanics applied to biological/biomedical problems. Mechanical properties of biological and commonly used biomedical engineering materials. Techniques for numerical solution of biomechanics problems. Lecture/laboratory.

BMEn 3002. Biomechanics Laboratory. (1 cr; A-F only. Prereq–Math 2374, Phys 1302, [BME upper div or Δ]; not intended for students taking 3001)
Laboratory experiments in statics, dynamics, and deformable body mechanics applied to biological/biomedical problems.

BMEn 3101. Biomedical Transport Processes. (4 cr; A-F only. Prereq–Math 2374, Phys 1302, [BMEn upper div or Δ])
Principles of momentum, heat, and mass transfer illustrated with applications in physiological processes. Fluid mechanics, heat condition, mass diffusion, convection. Lecture/laboratory.

BMEn 3102. Biomedical Transport Processes Laboratory. (1 cr; A-F only. Prereq–Math 2374, Phys 1302, [BME upper div or Δ]; not intended for students taking 3101)
Laboratory experiments in momentum, heat, and mass transfer illustrated with applications in physiological processes.

BMEn 3201. Bioelectricity and Bioinstrumentation. (4 cr; A-F only. Prereq–[Math 2263 or Math 2374], Phys 1302, [BME upper div or Δ])
Principles of electrical phenomena, instruments relevant to biomedical applications. Lecture/laboratory.

BMEn 3202. Bioelectricity and Bioinstrumentation Laboratory. (1 cr; A-F only. Prereq–Math 2374, Phys 1302, [BME upper div or Δ]; not intended for students taking 3201)
Laboratory experiments in electrical phenomena. Instruments relevant to biomedical applications.

BMEn 3301. Biomaterials. (4 cr; A-F only. Prereq–[Math 2263 or Math 2374], Phys 1302, [BMEn upper div or Δ])
Principles of biomaterials. Organic chemistry and biochemistry of natural/artificial biomaterials. Physical characterization and mechanical testing. Biomedical applications. Lecture/laboratory.

BMEn 3302. Biomaterials Laboratory. (1 cr; A-F only. Prereq–Math 2374, Phys 1302, [BME upper div or Δ]; not intended for students taking 3301)
Laboratory experiments with biomaterials. Organic chemistry and biochemistry of natural/artificial biomaterials. Physical characterization and mechanical testing. Biomedical applications.

BMEn 3701. Physiology Lab. (2 cr; A-F only. Prereq–[Math 2263 or Math 2374], Phsl 3061, Phys 1302, [BMEn upper div or Δ])
Laboratory experiments in physiology. Emphasizes quantitative aspects, including analysis of organ systems.

BMEn 4001W. Biomedical Engineering Design I. (3 cr; A-F only. Prereq–2501, 3001, 3101, 3301, 3701)
Design/analysis of biomedical devices/technologies. Students work in teams on open ended design project, present completed work at design show.

BMEn 4002W. Biomedical Engineering Design II. (3 cr; A-F only. Prereq–4001W)
Continuation of 4001W.

BMEn 4710. Directed Research. (1-4 cr [max 4 cr]; A-F only. Prereq–#, Δ)
Independent laboratory research under faculty supervision.

BMEn 4720. Directed Study. (1-4 cr [max 4 cr]; A-F only. Prereq–#, Δ)
Directed study under faculty supervision.

BMEn 4910. Special Topics in Biomedical Engineering. (1-4 cr [max 4 cr]; A-F only. Prereq–#)
New or experimental special topics.

BMEn 5001. Advanced Biomaterials. (3 cr; A-F only. Prereq–1st yr grad BMEn major; [general chem, organic chem, biochem, polymer sci] recommended)
Commonly used biomaterials. Chemical/physical aspects. Practical examples from such areas as cardiovascular/orthopedic applications, drug delivery, and cell encapsulation. Methods used for chemical analysis and for physical characterization of biomaterials. Effect of additives, stabilizers, processing conditions, and sterilization methods.

BMEn 5041. Tissue Engineering. (3 cr. Prereq–IT upper div or grad student or med student or #)
Fundamentals of wound healing and tissue repair; characterization of cell-matrix interactions; case study of engineered tissues, including skin, bone marrow, liver, vessel, and cartilage; regulation of biomaterials and engineered tissues.

BMEn 5101. Advanced Bioelectricity/ Instrumentation. (3 cr. Prereq–Phsl 5440, calculus, college physics)
Instrumentation, computer systems, and processing requirements for clinical physiological signals. Electrode characteristics, signal processing, and interpretation of physiological events by ECG, EEG, and EMG. Measurement of respiration and blood volume/flow.

BMEn 5102. Bioelectric Measurements and Therapeutic Devices II. (3 cr. Prereq–5101)
Theory and application of electrical stimulation in areas of therapeutic and functional neuromuscular stimulation and pain control, cardiac pacing, defibrillation, tissue healing, and electrotherapy. Safety of electric fields. Electrical tissue impedance measurements.

BMEn 5151. Biomedical MEMS. (4 cr; A-F only. Prereq–Analog circuit principles, basic electromagnetic theory)
Survey of solid-state biomed transducers. Physical principles of operation and technology implementation of microsensors/microactuators. Physical, chemical, and biomed sensors. Actuators for surgery. Other precision positioning applications, materials, and fabrications. Emphasizes recent advances in biomed microelectromechanical systems.

BMEn 5201. Advanced Biomechanics. (3-4 cr. Prereq–[[IT upper div or grad student], AEM [statics, deformable media]] or #)
Introduction to biomechanics of musculoskeletal system. Anatomy, tissue material properties. Kinematics, dynamics, and control of joint/limb movement. Analysis of forces/motions within joints. Application to injury, disease. Treatment of specific joints, design of orthopedic devices/implants.

BMEn 5311. Advanced Biomedical Transport Processes. (3-4 cr. Prereq–IT upper div or grad student or #; [ChEn 5103 or ME 5342] recommended)
Introduction to biological fluid, mass, and heat transport. Mass transfer across membranes. Fluid flow in vessels/interstitium. Heat transfer in cells, tissues, and body. Applications to blood oxygenation, respiration, drug delivery, and tissue engineering.

BMEn 5351. Cell Engineering. (3 cr. Prereq–5301 or equiv, 5310 or equiv, 5201 or equiv, IT upper div or grad student or #)
Survey of engineering approaches to cell-related phenomena important to cell and tissue engineering: receptor/ligand binding, trafficking and signaling processes; applications to cell proliferation, adhesion, and motility; cell-matrix interactions.

BMEn 5371. Biomedical Applications of Heat Transfer in Humans. (3-4 cr. Prereq–Phsl 3061, Phsl 3071, Phsl 5061)
Overview of physiology underlying thermoregulation in humans, clinical applications of heat transfer in humans, framework for design project.

BMEn 5444. Muscle. (3 cr)
Muscle structure/function: molecular mechanism by which force is generated.

BMEn 5501. Biology for Biomedical Engineers. (3-4 cr. Prereq–Engineering upper div or grad student)
Concepts of cell/tissue structure/function. Basic principles of cell biology. Tissue engineering, artificial organs.

BMEn 5502. Pathobiology of Medical Devices. (3 cr; A-F only. Prereq–IT upper division or grad student)
Biological response to biomaterials presented in context of fundamental principles of cell injury, adaptation, repair, or death. Diversity of medical uses of biomaterials, by organ system. Unique features of specific biological systems in which medical devices are used.

BMEn 5910. Special Topics in Biomedical Engineering. (1-4 cr)
Special topics.

BMEn 5920. Special Topics in Biomedical Engineering. (2 4 cr)

Biosystems and Agricultural Engineering (BAE)

Department of Biosystems and Agricultural Engineering

Institute of Technology

BAE 1011. Biosystems and Agricultural Engineering Orientation. (1 cr; S-N only)
Introduction to biosystems and agricultural engineering profession through readings and discussions by faculty, practicing engineers, and students; curriculum and intern, undergraduate research, and honors opportunities. Ethics, safety, environmental issues.

BAE 2113. Introduction to Design. (3 cr; A-F only. Prereq–Math 1271)
Creativity, problem formulation, identification of alternative solutions, safety/health considerations, economic feasibility. Engineering economics. Engineering graphics, computer drafting. Projects involving written, graphic, and oral presentations.

BAE 3013. Engineering Principles of Molecular and Cellular Processes. (3 cr; A-F only. Prereq–Biol 1009, [Chem 1022 or ¶Chem 1022])
Applied engineering principles in biological processes, classification of microbes of industrial importance, parameters for cellular control, modeling of cell growth/metabolism, enzymatic catalysis, bioreactor design, product recovery operations design, case studies.

BAE 3023. Engineering Principles of Soil-Water-Plant Processes. (3 cr. Prereq–Biol 1009, [CE 3502 or ¶CE 3502])
Physical, thermal, texture, strength, and moisture properties of soil. Saturated/unsaturated moisture movement. Energy/water balances in soil-plant systems. Plant stresses from drought, flooding, temperature, radiation, compaction, pollution. Engineering/management impacts on soil-water-plant systems.

BAE 3093. Directed Studies. (1-5 cr. Prereq–#)
Independent study of topic(s) involving physical principles as applied to agricultural production and land resources.

BAE 4013. Transport in Biological Systems. (4 cr; A-F only. Prereq–3013, CE 3502, ME 3324, upper div IT)
Application of thermodynamics, fluid flow, heat/mass transfer to design problems involving biological processes and materials at cell, organism, and system level. Agricultural, environmental, food, and bioprocess applications. Solution of equations involving computer programming assignments. Hands-on instruction in Visual Basic.

BAE 4023. Instrumentation and Control for Biological Systems. (3 cr. Prereq–EE 3005 or ¶EE 3005, Stat 3021, upper div IT)
Measurement of motion, force, pressure, flow, temperature, size, shape, color, texture, rheology, moisture, water mobility, fat, and pH. Linking physical and biological control systems.

BAE 4112W. Senior Design I. (2 cr; A-F only. Prereq–2113, upper div IT, sr or #)
Review of design concepts and process. Case studies involving engineering design. Discussion of safety/ethical issues. Develop proposal for senior design project (individual or group) to be completed in 4122. Oral presentation of written proposal.

BAE 4122W. Senior Design II. (2 cr; A-F only. Prereq–4112)
Complete design project started in 4112. Report, poster, and oral presentation of final design.

BAE 4313. Design of Machine Systems. (3 cr. Prereq–AEM 2021, AEM 3031, upper div IT)
Case studies of machines/processes. Design for world markets; crop production (tractors, harvesters, implements); food- and crop-processing systems (pumping, conveying); animal systems (milking parlor design, waste-handling machines).

BAE 4323. Machinery Elements. (3 cr. Prereq–AEM 2021, AEM 3031, upper div IT)
Building blocks for machines used in crop production and food processing. Power from diesel engines, electric/hydraulic motors. Performance characteristics, efficiency. Machine-control systems modeling (electro-hydraulic), machinery/hydraulic circuit design, safety.

BAE 4523. Water Management Engineering. (3 cr; A-F only. Prereq–3023 or CE 3301, CE 3502, upper div IT)
Applying engineering principles to management of water for production and environmental protection in agricultural systems. Designing facilities to irrigate/drain croplands and enhance water quality.

BAE 4533. Agricultural Waste Management Engineering. (3 cr. Prereq–3023, upper div IT)
Sources and characteristics of agricultural wastes, including livestock, food processing, and domestic wastes. Physical, biological, chemical, rheological, and microbiological properties. Effects on environment. Collection, storage, treatment (aerobic and anaerobic), and use/disposal. Land application.

BAE 4713. Bioprocess Engineering. (3 cr; A-F only. Prereq–3013, upper div IT)
Fermentation and separation as applied to biological systems; product recovery in bioproduct technology; topics in bioremediation; modeling of separation processes in biological systems.

BAE 4723. Food Process Engineering. (3 cr. Prereq–CE 3502, [ME 3324 or ¶ME 3324], upper div IT)
Application of principles of heat transfer and fluid flow to design of food processing operations such as thermal/aseptic processing, freezing, pumping, drying, evaporation, extrusion. Marketing, government regulation, nutrition issues.

BAE 4900. Intern Reports. (2 cr [max 4 cr]; S-N only. Prereq–IT or COAFES student in BAE, #)
Reports on intern work assignments reviewed by faculty and industry advisers.

BAE 5095. Special Problems. (1-5 cr. Prereq–#)
Advanced individual-study project. Application of engineering principles to specific problem.

BAE 5513. Watershed Engineering. (3 cr. Prereq–3023, upper div IT)
Application of engineering principles to managing surface runoff from agricultural, range, and urban watersheds. Design of facilities and selection of land use practices for controlling surface runoff to mitigate problems of flooding and degradation of surface-water quality.

Business Administration (BA)

Curtis L. Carlson School of Management

BA 1001. Introduction to Information Technology. (1 cr; S-N only)
Assess computing skills. Identify resources to develop skills in word processing, spreadsheets, presentation software, e-mail, LUMINA, remote access, and Web. Self-paced.

BA 1910W. Freshman Seminar, Writing Intensive. (2 cr [max 6 cr]; A-F only)
Topics vary. See *Class Schedule*.

BA 1998. Independent Study. (1-4 cr [max 8 cr]. Prereq–[CSOM fr or soph], ❑)
Special project or independent study.

BA 3000. Career Skills. (1 cr; A-F only. Prereq–CSOM [soph or jr])
Career planning. Use of Carlson School of Management's Business Career Center. Students gain awareness, knowledge, skills associated with career/job search process.

BA 3033W. Business Communication. (3 cr; A-F only. Prereq–Fr composition, CSOM upper-division)
Written/oral communications skills for effective participation in contemporary organizations. From basic principles to communication strategy. Communication technology. Cases, simulations of "real-world" situations. Students are required to meet with instructor three times a semester in small groups for presentation coaching/feedback. Recitation times are arranged with instructor at start of semester.

BA 3100. Global Seminar. (3 cr [max 12 cr]; A-F only. Prereq–Undergrad, GPA of at least 2.50)
Topics may vary from year to year.

BA 3101W. Global Seminar: Supplemental Writing. (1 cr [max 2 cr]; A-F only. Prereq–¶3100)
Projects developed by instructor of Global Seminar. Students analyze/process intercultural experience of studying abroad. Individualized feedback/coaching in writing skills. Taught during intersession. Writing intensive, if concurrently enrolled in 3100.

BA 3990H. Honors Topics. (2 cr; A-F only)
Offered in conjunction with Minnesota Mutual Foundation leadership perspectives program.

BA 3998. Independent Study. (1-4 cr. Prereq–CSOM upper div, ❑)
Student-initiated project or independent study.

BA 3999. Internship Seminar. (1 cr; S-N only. Prereq–30 cr, approved internship, #)
Integrates students' internship experiences with in-class discussions, relevant readings/assignments on issues related to world of work, workplace, and transition from college to work.

BA 5100. BSB - Foreign Studies. (1-16 cr [max 32 cr]; S-N only. Prereq–❑)
Registration for approved undergraduate study abroad programs.

Business and Industry Education (BIE)

Department of Work, Community, and Family Education

College of Education and Human Development

BIE 1396. Supervised Career and Technical Education Teaching. (4 cr; S-N only. Prereq–Approval of adviser)
Supervised teaching for beginning teachers, or teaching activities for preservice teachers.

BIE 3061. Professional Sales Management. (3 cr; A-F only)
Examination of the sales manager's role in training and mentoring sales representatives in strategic selling, customer-oriented service, and problem-solving tactics. Includes recruitment, hiring, training, and retention of a sales force.

BIE 3111. Exploring Technology Systems. (3 cr)
Communication, information, construction, manufacturing, design, technical drawing, biotechnology, energy, power, and transportation technologies. Students develop problem solving and manipulative skills as well as understanding of the principles and processes through hands-on activities in a multiple activity laboratory.

BIE 3112. Technical Drawing and Production Technologies. (3 cr; A-F only)
Instruction and laboratory experiences in technical drawing and design technologies; production technologies related to construction and manufacturing. Students will develop manipulative skills and techniques and an understanding of principles and processes of the technologies through hands-on work and lab activities.

BIE 3113. Manufacturing Technology. (3 cr. Prereq–¶3111)
Manufacturing concepts, principles, and applications. Automated manufacturing, including computer integrated manufacturing and robotics. Design, operation, and management of manufacturing systems/products. Lab.

BIE 3114. Construction Technology. (3 cr. Prereq–¶3111)
Introduction to principles, concepts, and techniques involved in civil, commercial, and residential construction. Laboratory experiences in planning, designing, organizing, producing, and testing structures.

BIE 3121. Communication, Power and Energy, Transportation and Machinery Technologies. (3 cr; A-F only)
Instruction and laboratory experiences in communication, information, power, energy, and transportation technologies. Topics include power systems; transportation systems; information and communication systems; graphic communication and computer applications.

BIE 3122. Communication and Information Technology. (3 cr; A-F only. Prereq–¶3121)
Information/communication systems, electronic publishing, printing technology, broadcast/recording technologies, telephone/online communication, photography, multimedia, and computer technology. Lab.

BIE 3123. Energy, Power, and Transportation Technology. (3 cr; A-F only. Prereq–¶3121)
Mechanical, fluid, and electrical power/technologies associated with transportation of people/materials. Lecture, lab.

BIE 3151. Technical Development: Advanced. (1-30 cr [max 30 cr]. Prereq–#)
Credits awarded for work experience in business/industry.

BIE 3993. Directed Study: BIE. (1-4 cr [max 4 cr])
Self-directed study preceded by classroom instruction in basic research procedures.

BIE 5001. Teaching Marketing Promotion. (3 cr; A-F only)
Materials, methods, and approaches to teaching marketing promotion. Covers the basic elements of the marketing mix: advertising, promotion, public relations, direct selling, visual merchandising, and direct marketing.

BIE 5011. Introduction to Computer Applications. (3 cr)
Instructional uses of computers and representative business/marketing education applications, including word processing, databases, spreadsheets, and graphics.

BIE 5012. Advanced Word Processing. (3 cr. Prereq–5011 or equiv)
Develop/apply solution methods for office problems using word processing software including advanced editing, printing, and desktop publishing capabilities.

BIE 5013. Spreadsheet Analysis Using Computers. (3 cr. Prereq–5011 or equiv)
Using spreadsheets to analyze data, monitor business records, and create models.

BIE 5014. Database Computer Applications. (3 cr. Prereq–5011 or equiv)
Business needs for computerized databases. Using database software to develop, maintain, and prepare reports.

BIE 5015. Integrated Computer Applications in Business and Marketing Education. (3 cr. Prereq–[5011, 5012, 5013, 5014] or equiv)
Realistic business computer problems requiring integration of two or more application packages. Pedagogical issues of learning/teaching advanced computer applications.

BIE 5080. Special Topics in Business and Industry Education. (1-4 cr [max 4 cr])
Content varies by offering.

BIE 5101. Technological Problem Solving. (3 cr; A-F only. Prereq–3111, 3112, 3121, 3122)
Capstone technology education course in which students research problems relative to various technological systems and develop solution(s) to the identified problems.

BIE 5151. Technical Development: Specialized. (1-12 cr [max 12 cr]; A-F only)
Students select and study technical processes and principles based on the particular subject matter areas they plan to teach. Experiences allow students to integrate specialized technical instruction in advanced and emerging areas.

BIE 5321. Vocational Guidance in Business and Industry Education. (2 cr; A-F only)
Self assessment, use of occupational and labor market information, job seeking skills, work and work satisfaction. For industrial teachers and trainers in school and industry settings.

BIE 5325. Foundations of Industrial Education. (3 cr)
Social, economic, psychological, philosophical, legislative, and pedagogical foundations of industrial education in the United States. Comparison with selected foreign countries. Analysis of contemporary trends against backdrop of early foundations.

BIE 5344. Facilities Management in Business and Industry. (3 cr; A-F only. Prereq–3112)
Planning, evaluating, and managing industrial education shop and lab facilities.

BIE 5365. Curriculum Development in Technology Education. (3 cr)
Conceptualization and derivation of content for the K-12 technology curriculum. Comparison of U.S. approaches to technology curriculum with selected countries.

BIE 5440. Business and Industry Observation and Seminar. (1-3 cr [max 6 cr])
Current operating practices and career opportunities in business and industry. Planned experiences in work environments and related seminars.

BIE 5452. Methods of Teaching Business and Marketing Concepts. (3 cr; A-F only)
Recent research/developments in teaching business concepts related to economics, business organization/management, business law, entrepreneurship, marketing, international business, information systems, accounting, risk management, and personal finance.

BIE 5457. Methods of Teaching Business Employment and Marketing Employment. (3 cr; A-F only)
Recent research/developments in teaching for business employment. Administrative support positions, accounting/information processing, marketing, sales, computer operations, other occupations using desktop computing.

BIE 5463. Methods in Teaching Keyboarding and Word Processing. (2 cr; A-F only)
Implementing keyboarding and word processing; effective teaching strategies; expected learner outcomes; evaluation methods; selecting hardware; instructional materials (including print, software, Internet); organizing and managing labs.

BIE 5475. Curriculum Development for Business and Marketing Education. (3 cr; A-F only)
Introduction to conceptual models for design/delivery of business/marketing education programs in secondary/postsecondary schools, in adult education settings, and in business/industry. Preparing programs of instruction for secondary/postsecondary level. Making decisions regarding course content.

BIE 5596. Occupational Experience in Business and Industry. (1-10 cr [max 10 cr]; S-N only. Prereq–#)
Observation/employment in business/industry to develop technical/occupational competencies. Includes 100 clock hours of supervised work experience per credit.

BIE 5597. Internship: Business and Industry Education. (1-8 cr [max 12 cr]; S-N only. Prereq–#)
Practical experience in business or industry as a professional educator or supervisor. Requires an integrative paper.

BIE 5605. Critical Issues in Business and Industry. (3 cr)
Identification and analysis of major current issues in business and industry education.

BIE 5624. Sales Training. (3 cr; A-F only)
Training competent customer service employees as part of a marketing strategy. Explore training strategies using the appropriate instructional methods for different settings and situations.

BIE 5625. Technical Skills Training. (3 cr)
Analyze technical skills and training practices in business and industry; systems and process analysis; trouble-shooting of work behavior; design methods and developing training materials.

BIE 5626. Customer Service Training. (3 cr; A-F only)
Overview of customer service strategies used by successful organizations and training practices used to develop customer-oriented personnel.

BIE 5627. Management and Supervisory Development. (3 cr)
Problems, practices, programs, and methodologies relating to the training and development of managers and supervisors, including needed competencies, needs assessment, delivery modes, and evaluation.

BIE 5628. Multimedia Presentations in Business. (3 cr. Prereq–5011 or equiv)
Designing, creating, and presenting information using multimedia resources in business settings.

BIE 5662. Computer Training in School and Industry Settings. (3 cr. Prereq–5011 or equiv)
Alternative teaching practices for business applications software: word processors, spreadsheets, graphics, desktop publishing, databases, and communications; public school and industry settings.

BIE 5796. Field Based Projects in Business and Industry. (1-4 cr [max 4 cr]; S-N only)
Curricular, instructional, developmental, or evaluative problems and projects applicable to local school or business and industry situations.

BIE 5801. The Business of Tourism. (3 cr; A-F only)
Introduction to major theories, concepts, skills, and techniques influencing tourism business/industry.

BIE 5802. Education and Human Resource Development Through Tourism. (3 cr; A-F only)
Policies/practices of education and human resource development in tourism industry.

BIE 5803. Tourism Studies Capstone Seminar. (3 cr; S-N only. Prereq–Tourism studies major)
Students present, critique, and discuss implications of supporting programs for tourism.

BIE 5993. Directed Study in Business and Industry. (1-4 cr [max 4 cr])
In-depth individual inquiry in the content areas related to business and industry.

Business Law (BLaw)

Department of Accounting
Curtis L. Carlson School of Management

BLaw 3058. The Law of Contracts and Agency. (4 cr; A-F only. Prereq–40 or more credits)
Origin of law, its place in and effect on society; history and development of law; system of courts; legal procedure. Law of contracts as the basic law affecting business transaction. Laws affecting the sale of goods and contracts and the law of agency.

BLaw 5078. Partnerships and Corporations. (2 cr)
Partnership and corporate forms of business entities, including methods of creating the relationships and the study of law used to regulate and control these organizations and their members.

BLaw 5088. Law of Personal Property, Real Property, and Commercial Paper. (2 cr)
Basic concepts of personal property, including rights of possessors, bailees, and finders and holders of security interests. Real property law. Transfers of ownership, control of and encumbering such interests. The law of paper (negotiable instruments).

Center for Spirituality and Healing (CSpH)

Health Sciences

CSpH 5000. Explorations in Complementary Therapies and Healing Practices. (1-4 cr [max 12 cr]. Prereq–Jr or sr or grad student or #)
Research/practice, delivery of complementary therapies, regulatory issues.

CSpH 5101. Introduction to Complementary Healing Practices. (3 cr. Prereq–Jr or sr or grad student or #)
Cultural contexts of healing traditions. Complementary therapies presented by practitioners, including traditional Chinese medicine, meditation, mind-body healing, spiritual practices, energy healing, naturopathy, herbalism, movement therapies, homeopathy, manual therapies, and nutrition.

CSpH 5102. Art of Healing: Self as Healer. (1 cr. Prereq–Jr or sr or grad student or #)
Introduction to individual transformational journey as part of health science education. Students become aware of their responsibility/resources to facilitate development of the self. Research data, experience of self that is part psychoneuroimmunology, mind-body-spirit approaches. Lecture, scientific literature, meditation, imagery, drawing, group interaction.

CSpH 5111. Ways of Thinking About Health. (2 cr. Prereq–Jr or sr or grad student or #)
Diverse healing traditions of selected cultures. Use of herbal medicines as essential component of social structure. Links between nature, humans, and indigenous healers. Use of foods as healing medicines in India, China, and ancient Greece. Connection between spirituality and healing powers in indigenous/modern cultures. Rise of scientific traditions, their influence on ways of thinking about healing.

CSpH 5201. Spirituality and Resilience. (2 cr. Prereq–Jr or sr or grad student or #)
Links between resilience and spirituality. Applications of resilience/health realization model to students' personal/professional lives. Review of literature, theory, and research.

CSpH 5211. Peacemaking and Spirituality: A Journey Toward Healing and Strength. (3 cr; A-F only. Prereq–Jr or sr or grad student or #)
Influence of spirituality on resolving conflict, making peace in intense interpersonal/intrapersonal conflicts in multiple health care, social work settings.

CSpH 5221. Significant Spiritual Texts of the 20th Century. (2 cr. Prereq–Jr or sr or grad student or #)
Diverse "spiritual classics" (i.e., elements of western canon that have proven over time to be resources of values). Resources of meaning for inner-life healers. How to establish a personal library for life-long journey of spiritual development.

CSpH 5301. Cultures, Faith Traditions, and Health Care. (2 cr; A-F only. Prereq–Jr or sr or grad student or #)
Culturally/spiritually based health care practices of selected native/immigrant populations in Minnesota. Clinical implications. Personal/professional conflicts for delivery of competent care to culturally diverse groups by those trained in Western health care.

CSpH 5311. Introduction to Traditional Chinese Medicine. (2 cr; A-F only. Prereq–Jr or sr or grad student or #)
Philosophical roots of Shamanism, Confucianism, Taoism, and Buddhism. Influence of these philosophies on Chinese medicine. Evolution of concepts of the Tao, Yin-Yang, microcosm, macrocosm. Development of herbal medicine, Tui Na, Qi Gong, acupuncture, moxibustion. Traditional Chinese medicine etiology of disease, physiology, diagnosis, therapy, disease prevention, ethics, psychology, cosmology.

CSpH 5321. Introduction to International Health. (2 cr. Prereq–Jr or sr or grad student or #)
Primary public health problems, priorities, and interventions in developing countries. Issues related to culture/indigenous health systems and of concern to health care providers who work abroad or with refugee communities in countries of resettlement.

CSpH 5401. People, Plants, and Drugs: Introduction to Ethnopharmacology. (3 cr. Prereq–Jr or sr or grad student or #)
Biologically active substances used in traditional cultures. Ethnopharmacology's past, current, and potential contributions to human knowledge. Concrete examples.

CSpH 5411. Dietary Supplements: Regulatory, Scientific, and Cultural Perspectives. (3 cr. Prereq–Jr or sr or grad student or #)
Concepts/principles of dietary supplements, RDA, dose-response, risk assessment. Laws/regulations concerning dietary supplements. Vitamin/mineral supplements. Philosophy/use of botanicals/nutraceuticals and common herbal supplements in western medicine. Use of supplements and evidence-based recommendations as influenced by culture.

CSpH 5501. Clinical Aromatherapy I. (2 cr. Prereq–Jr or sr or grad student or #)
Controlled use of essential plant oils for specific, measurable physiological/psychological therapeutic outcomes. History, scientific basis, practice issues, use of 19 essential oils in clinical practice.

CSpH 5502. Clinical Aromatherapy II. (2 cr. Prereq–5501)
Additional applications of clinical aromatherapy, including chemical basis for therapeutic effects, clinical use of 14 essential oils.

CSpH 5511. Interdisciplinary Palliative Care: An Experiential Course in a Community Setting. (2 cr)
Multidisciplinary student teams partner with interdisciplinary community hospice teams in delivery of care to patients in a variety of settings. Series of seminars employs self-analysis/case studies.

CSpH 5521. Therapeutic Landscapes. (3 cr. Prereq–[Jr or sr or grad student] in [health sciences or therapeutic recreation or horticulture or landscape architecture] or health professional or #)
Principles of therapeutic design for specific population requirements. Therapeutic landscape design. Incorporates interdisciplinary interaction between horticulture, landscape architecture, and health science departments.

CSpH 5601. Music, Health, and Healing. (2 cr. Prereq–Jr or sr or grad student or #)
Music therapy, music medicine, music psychotherapy. Techniques/interventions. Hypotheses/rationale related to interventions. Related research.

Central Asian Studies (CAS)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

CAS 1904. Freshman Seminar. (3 cr; A-F only)
Topics vary. See *Class Schedule*.

CAS 3511. Ancient Iran. (3 cr. §MELC 3511)
Development of ancient Iranian culture under the Achaemenians and Sassanians; the impact of the Zoroastrian religion on Iranians and of Hellenism on the east, especially on domains such as Bactria; Iran's contribution to the flourishing cultures of the Silk Road.

CAS 3512. Modern Iran. (3 cr. §MELC 3512)
The development of medieval Iranian culture under the Arab, Turkish, and Mongol rules. Study two major trends: Islamization beginning after the Arab conquest to A.D. 1500; westernization from the Safavids to the Islamic Republic in 1979.

CAS 3526. Islam and Communism. (3 cr. §5526, §MELC 3526)
Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic principles with Communist dicta; Pan-Islamism; Pan-Turkism.

CAS 3531. Central Asian Culture. (3 cr. §MELC 3531)
Development of Central Asian cultures from the rise of the Turkish dynasties (6th c.) to the present. Indo-European indigenous population displaced by the Arabs, Turks, Mongols, and the Soviets. Major themes: Islamization; Turkification; Westernization; and Sovietization.

CAS 3532. Russia and Central Asia. (3 cr. §5532, §MELC 3532)
Rise and fall of the Mongol Empire, formation of the Chaghatai Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

CAS 3601. Fiction of Iran and Central Asia in Translation. (3 cr. §5601, §MELC 3601)
Social, political, and religious thought of Iranian and (Soviet) Central Asian writers of fiction since the early years of the 20th century; emphasizes themes of tradition, modernization (Westernization and Sovietization), women's rights, and secularization.

CAS 3602. Persian Poetry in Translation. (3 cr. §5602, §MELC 3602)
Major poetic works of Iran in translation dealing with life at the medieval courts, Sufic poetry, and "new" poetry. Rudaki, Khayyam, Rumi, Hafiz, Yushij, and Farrukhzad are among the poets whose works are examined.

CAS 3900. Topics in Central Asian Studies. (1-4 cr [max 16 cr]; A-F only)
Topics vary. See *Class Schedule* or contact department for details.

CAS 5311. Medieval Sages. (3 cr. §MELC 5311. Prereq–Background in Iranian, Central Asian, or Islamic studies recommended)
Study and discussion of the intellectual life of the region from the rise of the Ghaznavids (A.D. 1000) to the fall of the Timurids (A.D. 1500). Ibn Sina (Avicenna), al-Biruni, al-Ghazali, Rumi, Sa'di, and Firdowsi are among the sages whose lives are examined.

CAS 5526. Islam and Communism. (3 cr. §3526, §MELC 5526)
Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic principles with Communist dicta; Pan-Islamism; Pan-Turkism.

CAS 5532. Russia and Central Asia. (3 cr. §3532, §MELC 5532)
Rise and fall of the Mongol Empire, formation of the Chaghatai Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

CAS 5601. Fiction of Iran and Central Asia in Translation. (3 cr. §3601, §MELC 5601)
Social, political, and religious thought of Iranian and (Soviet) Central Asian writers of fiction since the early years of the 20th century, emphasizing themes of tradition, modernization (Westernization and Sovietization), women's rights, and secularization.

CAS 5602. Persian Poetry in Translation. (3 cr. §3602, §MELC 5602)
Major poetic works of Iran dealing with life at the medieval courts, Sufic poetry, and "new" poetry are studied. Rudaki, Khayyam, Rumi, Hafiz, Yushij, and Farrukhzad are among the poets whose works are examined.

CAS 5994. Directed Research. (1-10 cr. Prereq–#, Δ, ❑)

Chemical Engineering (ChEn)

Department of Chemical Engineering and Materials Science

Institute of Technology

ChEn 1001. Advances in Chemical Engineering and Materials Science. (1 cr; S-N only. Prereq–Recommended for [chemical engineering, materials science/engineering] majors)
Survey of important advances in chemical engineering, materials science/engineering. Design problems, career opportunities. Lectures, demonstrations, interactive exercises.

ChEn 4001. Material and Energy Balances. (4 cr; A-F only. Prereq–[Chem 2302 or ¶Chem 2302], [Math 2273 or ¶Math 2373 or equiv], [Math 2374 or ¶Math 2374 or equiv], Phys 1302, [CSci 1107 or ¶CSci 1107 or CSci 1113 or ¶CSci 1113 or #])
Description/analysis of chemical engineering systems: units/dimensions, materials balances on systems with/without chemical reactions, elementary phase equilibria/diagrams, energy balances. Numerical methods for typical chemical engineering problems.

ChEn 4002. Transport Phenomena. (4 cr; A-F only. Prereq–ChEn 4001, upper div ChEn major)
Fluid statics and dynamics and their applications to chemical engineering systems, conduction, and diffusion.

ChEn 4003. Heat and Mass Transfer. (4 cr; A-F only. Prereq–4001, 4002, upper div ChEn major)
Principles/applications of heat/mass transfer in chemical engineering systems.

ChEn 4004. Separation Processes. (4 cr; A-F only. Prereq–4003, 4101, [upper div ChEn major or Δ])
Introduction to unit operations and mass transfer operations used in separation processes.

ChEn 4101. Chemical Engineering Thermodynamics. (4 cr; A-F only. Prereq–[4001 or ¶4001], Chem 3501, [upper div ChEn major or Δ])
Applications of concepts of thermodynamics and chemical equilibrium to problems in chemical engineering.

ChEn 4102. Reaction Kinetics and Reactor Engineering. (4 cr; A-F only. Prereq–4001, 4101, [upper div ChEn major or Δ])
Chemical equilibrium and chemical kinetics applied to chemical engineering systems. Behavior/design of chemical reactors, interaction between chemical and physical rate processes. Mathematical modeling, design of reactors.

ChEn 4214. Polymers. (3 cr. Prereq–Grade of at least C in MatS 3011 or #)
Polymer structure-property relations: structure/morphology of crystalline/amorphous states. Crystallization kinetics. Vitrification and the glass transition. Mechanical properties, failure, permeability, optical/electrical properties, polymer composites, effect of processing on properties.

ChEn 4401W. Chemical Engineering Lab I. (3 cr; A-F only. Prereq–4003, [4004 or ¶4004], 4101, [upper div ChEn major or Δ])
Principles/techniques of efficient design, structure, measurement, planning, analysis, and presentation of experiments and experimental results. Problems in energy balances, fluid flow, heat transfer, and mass transfer. Design of new systems using experimental data obtained in lab. Oral/written presentations.

ChEn 4402W. Chemical Engineering Lab II. (2 cr. Prereq–4003, 4004, 4101, 4401W, [upper div ChEn major or Δ])
Principles/techniques of efficient design, structure, measurement, planning, analysis, and presentation of experiments and experimental results. Experimental problems in energy balances, fluid flow, heat transfer, and mass transfer. Design of new systems using data obtained in lab. Oral/written presentations.

ChEn 4501W. Chemical Engineering Process Design. (3 cr. Prereq–4003, [4004 or ¶4004], 4102, [upper div ChEn major or Δ])
Engineering economics of process evaluation, including time/bases for cost estimation. Engineering design through group projects. Case studies.

ChEn 4502W. Chemical Engineering Process Design II. (2 cr; A-F only. Prereq–4004, 4501, [upper div ChEn major or Δ])
Continue review (from 4501) of unit processes/operations, introducing detail for design, cost analysis, control, operability, modifications, and alternatives. Case studies, special topics.

ChEn 4593. Directed Study. (1-4 cr. Prereq–#)
Directed study under faculty supervision.

ChEn 4594. Directed Research. (1-4 cr; A-F only. Prereq–#)
Independent lab research under faculty supervision.

ChEn 4601. Process Control. (3 cr; A-F only. Prereq–4102, [upper div ChEn major or Δ])
Analysis of dynamic behavior/design of linear control systems for chemical processes. Dynamic response and stability of linear ODE systems, tuning of PID controllers, synthesis of feedback, feedforward/feedback controller.

ChEn 4604. Process Control Laboratory. (2 cr; A-F only. Prereq–ChEn 4601 or ¶ChEn 4601)
Experiments designed to reinforce concepts and principles of process control taught in 4601. Introduce industrial-process instrumentation and control, and use of computers for data acquisition, analysis, and control.

ChEn 4701. Advanced Undergraduate Applied Math I: Linear Analysis. (3 cr; A-F only. Prereq–4002)
Integrated approach to solving linear mathematical problems (linear algebraic equations, linear ordinary/partial differential equations) using theoretical/numerical analysis based on linear operator theory. Undergraduate version of 8201.

ChEn 4702. Advanced Undergraduate Rheology. (3 cr; A-F only. Prereq–4002)
Deformation/flow of non-Newtonian/viscoelastic fluids, plastic materials, perfectly elastic solids. Phenomenological/molecular interpretation of rheology of elastomers, polymer melts, polymer solutions. Application of rheology to polymer processing. Undergraduate version of 8102.

ChEn 4703. Advanced Undergraduate Applied Math II: Nonlinear Analysis. (3 cr; A-F only. Prereq–ChEn 4002; grad-level course in linear analysis recommended)
Nonlinear mathematical problems (nonlinear ordinary/partial differential equations) using theoretical/numerical analysis. Undergraduate version of 8202.

ChEn 4704. Advanced Undergraduate Physical Rate Processes I: Transport. (3 cr; A-F only. Prereq–4002)
Survey of mass transfer, dilute/concentrated diffusion, Brownian motion. Diffusion coefficients in polymers, of electrolytes, at critical points. Multicomponent diffusion. Mass transfer correlations/predictions. Mass transfer coupled with chemical reaction. Undergraduate version of 8301.

ChEn 4705. Advanced Undergraduate Physical Rate Processes II: Mass Transfer. (3 cr; A-F only. Prereq–4002)
Applications of mass transfer. Membranes, including gas separation and reverse osmosis. Controlled drug release. Dispersion, including examples of pollution modeling. Adsorption/chromatography. Coupled heat/mass transfer, including cooling towers. Double-diffusive effects. Undergraduate version of 8302.

ChEn 4706. Advanced Undergraduate Physical and Chemical Thermodynamics. (3 cr; A-F only. Prereq–Chem 3502, 4101, 4002; recommend background in undergraduate engineering or chemistry courses in thermodynamics)
Principles of classical thermodynamics, introduction to nonequilibrium thermodynamics. Applications in chemical engineering, materials science. Undergraduate version of 8401.

ChEn 4707. Advanced Undergraduate Statistical Thermodynamics and Kinetics. (3 cr; A-F only. Prereq–4002, 4101, Chem 3501, Chem 3502)
Introduction to statistical mechanical description of equilibrium/non-equilibrium properties of matter. Emphasizes fluids, classical statistical mechanics. Undergraduate version of 8402.

ChEn 4708. Advanced Undergraduate Chemical Rate Processes: Analysis of Chemical Reactors. (3 cr; A-F only. Prereq–4102)
Design of reactors for heat management, with catalytic processes, through detailed analysis of steady state, transient behavior. Polymerization, combustion, solids processing, environmental modeling. Design of multiphase reactors. Undergraduate version of 8501.

ChEn 4709. Advanced Undergraduate Process Control. (3 cr; A-F only)
For linear systems: stability, controllability, observability, pole-placement via state feedback state observers, output feedback, robustness of control systems. For nonlinear systems: solution properties, stability analysis, singular perturbations, feedback linearization via state feedback, direct synthesis via output feedback. Undergraduate version of 8502.

ChEn 4710. Advanced Undergraduate Chemical Rate Processes: Homogeneous Reactions. (3 cr; A-F only. Prereq–4102)
Description/characterization of chemically reacting systems. Theories of elementary reactions. Experimental methods for investigating elementary reactions. Applications of chemical kinetics to complex reactions such as combustion, flames, atmosphere. Undergraduate version of 8503.

ChEn 5103. Porous Media. (3 cr; A-F only. §MatS 8219. Prereq–4003, 4102)
Geometry and topology of porous materials. Fundamentals of flow, transport, and deformation. One-phase and two-phase Darcy flows, convective dispersion in microporous materials. Relations of macroscopic properties and behavior to underlying microscopic structures and mechanisms. Nanoporous materials. Examples from nature and technology.

ChEn 5104. Coating Process Fundamentals. (3 cr; A-F only. Prereq–ChEn 4003, ChEn 4102)
Basic process functions; viscous flow and rheology, capillarity, wetting; electrostatic effects; phase change, colloidal transformations, mass/heat transfer in drying; kinetics in curing; stress and property development in solidification. Illustrations drawn from theoretical modeling, flow visualization, and stopped-process microscopy.

ChEn 5221. Introduction to Polymer Chemistry. (3 cr; A-F only. Prereq–[3502, Chem 2302] or #)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

ChEn 5302. Chemical Reaction Engineering and Catalysis. (3 cr; A-F only. Prereq–ChEn 4102)
Continuous and batch reactors, heat management, catalytic reactions and reactors, nonideal flow in reactors, polymerization, solids processing, multiphase reactors. Fundamentals and mechanisms of catalytic reactions. Industrial examples in petroleum/chemical industries.

ChEn 5531. Electrochemical Engineering. (3 cr. Prereq–[MatS 3011 or #], [upper div IT or grad student])
Fundamentals of electrochemical engineering. Electrochemical mass transfer electrokinetics, thermodynamics of electrochemical cells, modern sensors. Formation of thin films and microstructured materials. Computer-based problems.

ChEn 5595. Special Topics. (1-4 cr. Prereq–#)
New or experimental special topics.

ChEn 5751. Biochemical Engineering. (3 cr; A-F only. Prereq–4002, ¶4003, ¶4102)
Chemical engineering principles applied to analysis/design of complex cellular/enzyme processes. Quantitative framework for design of cells for production of proteins, synthesis of antibodies with mammalian cells, or degradation of toxic compounds in contaminated soil.

ChEn 5752. Quantitative Biology for Engineers. (3 cr; A-F only. Prereq–Engineering background, #)
Biological fundamentals of biotechnology. Structural basis of biological systems. Communication between cells/environment. Gene expression. Proteins and their functional classes. Metabolic pathways and their reactions. From gene/genome to physiology. Genomics/proteomics as technologies.
Biotechnology and society: ethics, law, public policy. Biotechnology-based commercial enterprises.

ChEn 5753. (Biological) Biomedical Transport Processes. (3 cr. §ME 5381, §BMEn 5310. Prereq–ChEn 4003 or ME 3322)
Introduction to fluid, mass, and heat transport in biological systems. Mass transfer across membranes, fluid flow in capillaries, interstitium, veins and arteries. Heat transfer in single cells and tissues. Whole organ and body heat transfer issues. Blood flow and oxygenation. Heat and mass transfer in respiratory system. Biotransport issues in artificial organs, membrane oxygenators, and drug delivery applications.

ChEn 5754. Food Processing Technology. (3 cr; A-F only. Prereq–ChEn 4002)
Introduction to food processing as it interfaces with engineering. Case studies. Engineering economics and practical design problems in food processing. Heat transfer; freezing, conduction (unsteady state); thermal processing; extruder design; protein processing; order-of-magnitude estimating; and economic concepts such as ROI, discounted cash flow, and capital estimating.

ChEn 5759. Principles of Mass Transfer in Engineering and Biological Engineering. (2 cr; A-F only. Prereq–ChEn 4002)
Principles of mass transfer in gases, liquids, biological and macromolecular solutions, gels, solids, membranes, and capillaries. Porous solids interaction between mass transfer and chemical reaction. Applications in biological, environmental, mineral, and chemical engineering systems.

ChEn 5771. Colloids and Dispersions. (3 cr; A-F only. Prereq–Physical chemistry)
Preparation, stability, coagulation kinetics or colloidal solutions. DLVO theory, electrokinetic phenomena. Properties of micelles, other microstructures.

Chemistry (Chem)

Department of Chemistry

Institute of Technology

Chem 1011. General Principles of Chemistry. (4 cr. Prereq–For students not passing placement exam; high school chemistry or equiv, two yrs high school math; high school physics recommended)
Introduction to chemistry, including elementary organic chemistry. Matter and energy, atoms, compounds, solutions, chemical reactions, mole and chemical calculations, gases, liquids, solids, chemical bonding, atomic and molecular structure, acids, bases, equilibria. Problem solving emphasized. Physical and chemical properties of hydrocarbons and organic compounds containing halogens, nitrogen, or oxygen.

Chem 1021. Chemical Principles I. (4 cr. Prereq–Primarily for science or engineering majors; 1011 or passing placement exam)
Atomic theory; periodic properties of elements; thermochemistry; reaction stoichiometry; behavior of gases, liquids, and solids; molecular and ionic structure and bonding; organic chemistry and polymers; energy sources and environmental issues related to energy use.

Chem 1022. Chemical Principles II. (4 cr. Prereq–1021 or equiv)
Chemical kinetics; radioactive decay; chemical equilibrium; solutions; acids and bases; solubility; second law of thermodynamics; electrochemistry and corrosion; descriptive chemistry of the elements; coordination chemistry; biochemistry; applications of chemical principles to environmental problems.

Chem 1031H. Honors Chemistry I. (4 cr; A-F only. Prereq–IT honors student or [❑, permission from IT honors office])
Advanced introduction to atomic theory. Periodic properties of elements. Behavior of gases, liquids, and solids. Molecular/ionic structure, bonding. Aspects of organic chemistry, spectroscopy, and polymers. Energy sources, environmental issues. Mathematically demanding quantitative problems. Writing for scientific journals. Lecture, lab.

Chem 1032. Honors Chemistry II. (4 cr; A-F only. Prereq–[1031 or equiv], [IT honors student or consent of IT honors office])
Advanced introduction. Chemical kinetics/reaction mechanisms, chemical/physical equilibria, acids/bases, entropy/second law of thermodynamics, electrochemistry/corrosion; descriptive chemistry of the elements; coordination chemistry; biochemistry; applications of chemical principles to environmental problems. Lab emphasizes writing for scientific journals.

Chem 1032H. Honors Chemistry II. (4 cr; A-F only. Prereq–[1031 or equiv], [IT honors student or consent of IT honors office])
Advanced introduction. Chemical kinetics/reaction mechanisms, chemical/physical equilibria, acids/bases, entropy/second law of thermodynamics, electrochemistry/corrosion; descriptive chemistry of the elements; coordination chemistry; biochemistry; applications of chemical principles to environmental problems. Lab emphasizes writing for scientific journals.

Chem 1905. Freshman Seminar. (1-3 cr; A-F only. Prereq–Fr with no more than 23 cr)
Topics vary. See freshman seminar topics.

Chem 1910W. Freshman Seminar: Writing Intensive. (1-3 cr; A-F only. Prereq–Fr with fewer than 24 cr)
Topics vary. See freshman seminar topics.

Chem 2094. Directed Research. (1-3 cr. Prereq–#)
Learning experience in areas not covered by regular courses. Individually arranged with faculty member.

Chem 2101. Introductory Analytical Chemistry Lecture. (3 cr. Prereq–1022 or equiv, ¶2301)
Primarily for chemistry majors. Methods and concepts of measurement by chemical and instrumental analysis, including titrimetry, quantitative spectrophotometric analysis, chromatographic separations, and equilibrium and rate methods.

Chem 2111. Introductory Analytical Chemistry Lab. (2 cr. Prereq–2101 or ¶2101)
Lab for 2101. High precision methods, acidimetry and complexometry, single and multicomponent analysis by spectrophotometry, analysis of mixtures by ion exchange and gas chromatography, enzymatic and rate methods.

Chem 2301. Organic Chemistry I. (3 cr. Prereq–1022 or equiv)
Important classes of organic compounds, their constitutions, configurations, and conformations and reactions; relationships between molecular structure and chemical reactivity/properties; spectroscopic characterization of organic molecules.

Chem 2302. Organic Chemistry II. (3 cr. Prereq–2301)
Reactions, synthesis, and spectroscopic characterization of organic compounds, organic polymers, and biologically important classes of organic compounds such as lipids, carbohydrates, amino acids, peptides, proteins, and nucleic acids.

Chem 2311. Organic Lab. (4 cr. Prereq–2302 or ¶2302)
Lab techniques in synthesis, purification, and characterization of typical organic compounds.

Chem 2312. Honors Organic Lab. (5 cr; A-F only. Prereq–[2301 or ¶2301], [Chem or ChemE or BioC] major, #)
Honors organic chemistry lab.

Chem 2910. Special Topics in Chemistry. (1 cr [max 6 cr]; S-N only. Prereq–1 sem 1xxx chemistry or #)
Topics in chemistry. Opportunities and current research.

Chem 2920. Special Topics In Chemistry. (1 cr [max 6 cr]; S-N only. Prereq–1 sem 1xxx chemistry or #)
Topics in chemistry. Opportunities and current research.

Chem 3001. Chemical Literature and Information Retrieval. (1 cr; S-N only. Prereq–2302 or ¶2302 or #)
Forms of chemical literature, relationships among them. Major information sources in chemistry. Basic search techniques for print/electronic sources, choosing sources most appropriate for various information needs.

Chem 3501. Physical Chemistry I. (3 cr. Prereq–[1022 or 1032H], [Math 2263 or Math 2374], [Phys 1302 or Phys 1402V])
Physical chemistry as it relates to macroscopic descriptions of chemical systems. Chemical thermodynamics, phase equilibria, chemical equilibria. Phenomenological reaction kinetics. Kinetic theory of gases. Collision theory of reaction rates. Thermodynamic vs. kinetic control of chemical reactions.

Chem 3502. Physical Chemistry II. (3 cr. Prereq–One yr college chemistry, one yr college physics, one yr college calculus)
Introduction to microscopic descriptions of chemical systems. Elementary quantum theory. Applications to atomic and molecular structure. Molecular spectroscopy. Quantum statistical mechanics. Statistical theories of reaction rates.

Chem 4094W. Directed Research. (1-5 cr [max 75 cr]. Prereq–Any 3xxx or 4xxx chem course, #)
Learning experience in areas not covered by regular courses. Individually arranged with faculty member.

Chem 4101. Intermediate Analytical Chemistry Lecture. (3 cr; A-F only. Prereq–2101, 2111, 2311, ¶3501)
Basic electronic, optical, computer technologies employed in design of chemical instrumentation. Advanced topics in spectroscopy (e.g., FT-nmr, FT-IR, atomic absorption/emission). Electrochemistry. Mass spectrometry.

Chem 4111W. Intermediate Analytical Chemistry Lab. (2 cr; A-F only. Prereq–4101, chemistry major)
Instrumental techniques, including spectroscopic methods, electrochemical methods, and analysis based on separation. Emphasizes use of computers in data collection and reduction.

Chem 4121. Process Analytical Chemistry. (3 cr; A-F only. Prereq–2302, 2311, 3501, chemical engineering major)
Strategies and techniques for analysis. Use of modern instruments, including spectrophotometry, chromatography and electrochemistry.

Chem 4311W. Advanced Organic Chemistry Lab. (2 cr. Prereq–2311)
Reactions, techniques, and instrumental methods in synthetic organic chemistry.

Chem 4411. Bioorganic Chemistry. (3 cr. Prereq–2302 or equiv)
Chemistry of amino acids, peptides, proteins, lipids, carbohydrates, and nucleic acids. Structure, nomenclature, synthesis, and reactivity. Techniques to characterize biomolecules.

Chem 4501. Physical Chemistry I. (3 cr; A-F only. Prereq–Grad student, one yr college chemistry, one yr college physics, one yr college calculus, Δ)
Introduction to physical chemistry as it relates to macroscopic descriptions of chemical systems. Chemical thermodynamics, phase equilibria, chemical equilibria. Phenomenological reaction kinetics. Kinetic theory of gases. Collision theory of reaction rates. Thermodynamic vs. kinetic control of chemical reactions.

Chem 4502. Physical Chemistry II. (3 cr; A-F only. Prereq–Grad student, one yr college chemistry, one yr college physics, one yr college calculus, Δ)
Introduction to microscopic descriptions of chemical systems. Elementary quantum theory. Applications to atomic/molecular structure. Molecular spectroscopy. Quantum statistical mechanics. Statistical theories of reaction rates.

Chem 4511W. Advanced Physical Chemistry Lab. (2 cr. Prereq–3501-3502, chemistry major)
Experiments illustrating principles and methods of thermodynamics, reaction kinetics, and quantum mechanics.

Chem 4701. Inorganic Chemistry. (3 cr. Prereq–2311, [3501 or ¶3501 or 3502 or ¶3502])
Advanced introduction to inorganic chemistry. Periodic trends. Structure and bonding concepts in compounds where s and p electrons are important. Descriptive chemistry of solids and transition metal compounds. Emphasizes transition metal chemistry. Advanced topics in main group and materials chemistry.

Chem 4711W. Advanced Inorganic Chemistry Lab. (2 cr; A-F only. Prereq–4701, chem major)
Lab experiments in inorganic/organometallic chemistry illustrating synthetic/spectroscopic techniques.

Chem 5011. Mechanisms of Chemical Reactions. (3 cr. Prereq–2302 or equiv)
Reaction mechanisms and methods of study. Mechanistic concepts. Gas phase reactions. "Electron pushing" mechanisms in organic and enzymatic reactions. Kinetic schemes and other strategies.

Chem 5021. Computational Chemistry. (3 cr. Prereq–3502 or equiv)
Theoretical methods for study of molecular structure, bonding, and reactivity. Ab initio and semi-empirical calculations of molecular electronic structure. Theoretical determination of molecular electronic structure and spectra; relation to experimental techniques. Molecular mechanics. Structure determination for large systems. Molecular properties and reactivity. Computational tools. Critical assessment of methods and theoretical work in the literature. Lab.

Chem 5201. Materials Chemistry. (3 cr. Prereq–[[3502 or equiv], 4701] or #)
Crystal systems/unit cells, phase diagrams, defects/interfaces, optical/ dielectric properties, electrical/thermal conductivity, X-ray diffraction, thin film analysis, electronic structure, polarons/phonons, solid state chemistry, liquid/molecular crystals, polymers, magnetic/optical materials, porous materials, ceramics, piezoelectric materials, biomedical materials, catalysts.

Chem 5210. Materials Characterization. (4 cr; A-F only. Prereq–Graduate student or #)
Modern tools/techniques for both bulk- and thin-film characterization. Topics may include ion-solid interactions, Rutherford back scattering, secondary ion mass spectrometry, solid-state NMR, X-ray photoelectron spectroscopy, small-angle X-ray/neutron scattering, transmission/scanning electron/probe microscopy, near-field scanning optical microscopy, porosimetry, adsorption techniques, and ellipsometry.

Chem 5221. Introduction to Polymer Chemistry. (3 cr. §MatS 5221. Prereq–[2302, 3501] or #)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

Chem 5223W. Polymer Laboratory. (2 cr. §MatS 5223. Prereq–[5221 or 8211] or #)
Synthesis, characterization, and physical properties of polymers. Free radical, condensation, emulsion, anionic polymerization. Infrared spectroscopy/gel permeation chromatography. Viscoelasticity, rubber elasticity, crystallization.

Chem 5311. Chemistry of Industry. (3 cr. Prereq–Chem sr or grad student or #)
Industrial and polymer chemistry technology. Relation of basic properties to industrial utility. Economics, social problems, industrial environment.

Chem 5321. Organic Synthesis. (3 cr. Prereq–[2302 or equiv], #)
Fundamental concepts, reactions, reagents, structural/stereochemical issues, and mechanistic skills for organic chemistry.

Chem 5322. Advanced Organic Chemistry. (3 cr. Prereq–2302 or equiv)
Topics vary, including natural products, heterocycles, asymmetric synthesis, organometallic chemistry, and polymer chemistry. (See instructor for details.)

Chem 5352. Physical Organic Chemistry. (3 cr. Prereq–2302, [5011 or 8011])
Fundamental concepts and mechanistic tools for analysis of organic reaction mechanisms. Solvation, reactive intermediates, gas phase chemistry, photochemistry or strained-ring chemistry or both.

Chem 5361. Interpretation of Organic Spectra. (3 cr. Prereq–2302 or equiv)
Application of nuclear magnetic resonance, mass, ultraviolet, and infrared spectral analyses to organic structural problems.

Chem 5412. Enzyme Mechanisms. (3 cr. Prereq–2302 or equiv)
Enzyme classification with examples from current literature; strategies to decipher enzyme mechanisms; chemical approaches to control enzyme catalysis.

Chem 5413. Nucleic Acids. (3 cr. Prereq–2302 or equiv)
Chemistry and biology of nucleic acids. Structure, thermodynamics, reactivity, DNA repair, chemical oligonucleotide synthesis, antisense approaches, ribozymes, techniques for nucleic acid research, interactions with small molecules and proteins.

Chem 5715. Physical Inorganic Chemistry. (3 cr. Prereq–4701 or equiv, chem major or #)
Physical methods (e.g., IR, UV-VIS, ESR, Mossbauer and mass spectroscopy, magnetic measurements, X-ray diffraction) and concepts applied to inorganic and organometallic systems.

Chem 5725. Organometallic Chemistry. (3 cr. Prereq–4701 or equiv, chem major or #)
Synthesis, reactions, structures, and other properties of main group and transition metal organometallic compounds; electronic and structural theory, emphasizing their use as stoichiometric and homogeneous catalytic reagents in organic and inorganic systems.

Chem 5735. Bioinorganic Chemistry. (3 cr. Prereq–4701 or equiv, chem grad or #)
Role of metal ions in biology. Emphasizes structure, function, and spectroscopy of metalloproteins and their synthetic analogs.

Chem 5745. Advanced Inorganic Chemistry. (3 cr. Prereq–4701, chem major, #)
Topics in main group and transition metal chemistry. Emphasizes synthesis, structure, physical properties, and chemical reactivity.

Chem 5755. X-Ray Crystallography. (4 cr; A-F only. Prereq–Chem grad student or #)
Essentials of crystallography as applied to modern, single crystal X-ray diffraction methods. Practical training in use of instrumentation in X-ray crystallography facility in Department of Chemistry. Date collection, correction/refinement, structure solutions, generation of publication materials, use of Cambridge Crystallographic Structure Database.

Chicano Studies (Chic)

Department of Chicano Studies

College of Liberal Arts

Chic 1105. Introduction to Chicana/o Studies: The Beginnings to 1875. (3 cr)
Convergence of Europe and America in Mesoamerica and the formation of Mexican society. Literary, social, cultural, and historical perspectives. Pre-Columbian period to 1875.

Chic 1105H. Honors: Introduction to Chicana/o Studies: Beginnings to 1875. (4 cr. §1105. Prereq–Honors)
Convergence of Europe, America in Mesoamerica. Formation of Mexican society. Literary, social, cultural, historical perspectives. Pre-Columbian period to 1875.

Chic 1106. Introduction to Chicana/o Studies: Mexico and the United States From 1871 to Present. (3 cr)
Convergence of Spanish-Mexican/Anglo-American societies in Spanish borderlands. Formation of contemporary Chicano political, economic, and cultural consciousness; forms in which it has been expressed.

Chic 1106H. Honors: Introduction to Chicana/o Studies: Mexico and the United States From 1871 to Present. (4 cr. §1106. Prereq–Honors)
Convergence of Spanish-Mexican/Anglo-American societies in Spanish borderlands. Formation of contemporary Chicano political, economic, cultural consciousness; forms in which it has been expressed.

Chic 3114. International Perspectives: U.S.-Mexico Border Cultures. (3 cr)
The relations of Mexico and the United States from an international perspective with central focus on the cultural interchange in the borderlands between them; using both literary and historical materials.

Chic 3212. La Chicana. (3 cr)
This class centers on Chicanas or politically defined women of the Mexican American community. Our method is interdisciplinary. It emphasizes the importance of historical context and cultural process to any discussion of the Chicana experience.

Chic 3375. Folklore of Greater Mexico. (3 cr)
Scholarly survey and exploration of the sociocultural function of various types of folklore in Greater Mexico. Students analyze the ways in which folklore constructs and maintains community, as well as resists and engenders cultural shifts.

Chic 3402. Las Mujeres. (3 cr)
Focus on Chicanas; women of the Mexican American community. Exploration of racial, economic, political, and gender issues of concern to all Mexican Americans and diverse Latino cultures.

Chic 3427. History of Cuba and Puerto Rico. (3 cr)
Historical development of Cuba and Puerto Rico from pre-Columbian times through the Spanish conquest to the present. Conquest and colonization, slavery, Hispanic Caribbean society and culture, Operation Bootstrap, Cuban Revolution.

Chic 3428. History of Relations Between U.S. and Mexico: 1821 to Present. (3 cr)
U.S.-Mexico relations in the 19th and 20th centuries; examining histories as they intersect in the late 1820s; loss of Texas; Mexican-American War; economic relations between the two countries including NAFTA and the Chiapas rebellion of 1994.

Chic 3441. Chicana/o History to 1900. (3 cr)
History of the Mexican people from the 16th through 19th centuries. Historical theories of colonialism, expansion, economy, assimilation, migration, and settlement; race, class, and gender; political, social, and cultural interaction and conflict.

Chic 3442. Chicana/o History: 1900 to Present. (3 cr)
Migration, repatriation, the Bracero program, politics, the Chicana/o movement, work, society, and culture.

Chic 3507. Introduction to Chicana(o) Literature. (3 cr)
Creative literature by Chicano and Chicana authors will be analyzed and interpreted through our understanding of Mexican American history, culture, and sociopolitical process; narratives as aesthetic production; merits and limitations of literary analysis.

Chic 3712. Chicanas(os): Psychological Perspectives. (3 cr)
Textual analysis of Chicana/Latina writings with special emphasis on the psychological motivations of the subjects pertaining to race, class, and gender relationships.

Chic 3993. Directed Studies. (1-9 cr [max 16 cr]. Prereq–#)
Guided individual reading, research, and study. Students often do preliminary readings and research in conjunction with plans for education abroad programs.

Chic 4231. The Color of Public Policy: African Americans, American Indians, and Chicanos in the United States. (3 cr)
Examination of the structural or institutional conditions through which people of color have been marginalized in public policy. Critical evaluation of social theory in addressing the problem of contemporary communities of color in the United States.

Chic 4401. Chicana/Latina Culture Studies. (3 cr)
Diversity of cultures that are called "Hispanic;" women in these cultures; Chicanas and Latinas living in the United States or migrating from their home nations to the United States.

Chic 5114. International Perspectives: U.S.-Mexico Border Cultures. (3 cr. §3114. Prereq–Grad)
The relations of Mexico and the United States from an international perspective with central focus on the cultural interchange in the borderlands between them; using both literary and historical materials.

Chic 5310. Chicanas/os and the Law. (3 cr)
Surveys the status of Chicanas and Chicanos in the law. A wide realm of case law and articles introduce key issues. Examines history, inequality, education, employment, affirmative action, criminal law, immigration, housing, and environmental racism.

Chic 5402. Chicanas: Women and Work. (3 cr. Prereq–Sr, #)
Chicanas and their various relationships to family and community; local, national, and global work forces. Exploration of larger questions and issues related to the growing integration of the world's systems of production.

Chic 5403. Chicana/Latina Feminisms. (3 cr. Prereq–Sr, #)
The historical and social development of Chicana and Latina feminisms in general and their various specific types. Includes women activists who do not self-identify as "feminists," but are fighting for equality.

Chic 5505. Indigenous Women and Land Issues. (3 cr)
Legal experience of indigenous women defending their land and property interests. Encompasses a social ecology approach to their land struggles, including cultural and legal histories of Native Americans, Mexicanas, and Chicanas.

Chic 5601. Migrant and Seasonal Agricultural Labor. (2 cr)
Surveys the agricultural workforce with a focus on legal theory. While its approach is interdisciplinary, its emphasis is on the legal construct. A wide realm of case law and articles address several key issues confronting agricultural laborers.

Chic 5701. History of Ancient Mexico. (3 cr)

Chic 5702. Literature of Ancient and Colonial Mexico. (3 cr. Prereq–Chicano studies sr, #)
Analysis and contextualization of ancient and colonial Mexican literature such as Popol Vuh, Rabinal Achi, Chilam Balam, Codex Mendoza, Juan Ruiz de Alarcon, and Sor Juana Ines de la Cruz.

Chic 5901. Chicana(o) Studies: Theory and Methodology. (3 cr)
Focus on theory and methodology of Chicano studies scholarship in social sciences and humanity.

Chic 5920. Topics in Chicana(o) Studies. (3 cr. Prereq–Sr or grad student, #)
Multidisciplinary themes in Chicano studies. Examine and analyze issues of current interest.

Chic 5921. Chicano Studies Topics: Women and the Law. (3 cr)
Surveys the status of women in the law. Wide realm of legal issues impacting women, with primary focus on Chicanas and Native American women. Historical, political, economic, social, and legal issues affecting women.

Chic 5993. Directed Studies. (1-3 cr [max 16 cr]. Prereq–#)
Guided individual reading, research, and study for completion of the requirements for a senior paper or honors thesis.

Child Psychology (CPsy)

Institute of Child Development

College of Education and Human Development

CPsy 2301. Introductory Child Psychology. (4 cr. Prereq–4 cr intro psych)
Introduction to the science of child behavior; review of theory and research.

CPsy 3301. Introductory Child Psychology for Social Sciences. (4 cr)
The science of child behavior; review of theory and research. Designed for majors in psychology, sociology, and related disciplines; not suggested for child psychology majors.

CPsy 3308. Introduction to Research Methods in Child Psychology. (4 cr; A-F only. Prereq–2301, Psy 1001)
Techniques used in the study of child development; emphasis on collection, organization, and analysis of data.

CPsy 3360. Child Psychology Honors Seminar. (2 cr; A-F only. Prereq–CPsy honors student)
Acquaints students with the various research projects and activities in the Institute for Child Development and in related departments. Faculty are invited to discuss their research projects with seminar participants.

CPsy 4302. Infant Development. (4 cr; A-F only. Prereq–CPsy 2301 or #)
Perceptual, motor, emotional, social, and cognitive development during the first two years of life; the developing infant in his or her social and physical environment.

CPsy 4303. Adolescent Psychology. (4 cr; A-F only. Prereq–Psy 1001)
Overview of development in the second decade of life. Interactions of adolescents with family, school, and society.

CPsy 4310. Special Topics in Child Development. (1-4 cr [max 12 cr]; A-F only. Prereq–Psy 1001)
Topics/credits vary.

CPsy 4311. Behavioral and Emotional Problems of Children. (4 cr; A-F only. Prereq–Intro psych)
Behavioral and emotional problems of children and adolescents; psychopathology contrasted to normal development; symptoms, causes, course, and prevention of common disorders, excluding physical and sensory handicaps.

CPsy 4313. Disabilities and Development. (4 cr. Prereq–Psy 1001)
Surveys all areas of exceptionality. Mental, hearing, vision, physical, speech, language handicaps. Learning disabilities. Autism. Emotional/behavior disorders. Giftedness.

CPsy 4329. Biological Foundations of Development. (4 cr; A-F only. Prereq–2301 or equiv)
Evolutionary theory and behavioral genetics applied to understanding of development of human behavior; formation of species-typical adaptive behavior and individual differences in infancy, childhood, and adolescence.

CPsy 4331. Social and Personality Development. (4 cr; A-F only. Prereq–CPsy 2301, Psy 1001)
Development of social relations and personality; research, methodology, and contrasting theoretical perspectives. Survey of findings on interpersonal relationships, the concept of self, prosocial and antisocial behavior, and acquisition of social roles.

CPsy 4334W. Children, Youth in Society. (4 cr; A-F only. Prereq–2301)
Child development principles relative to social policy decision making. Issues in applying theories, findings to problems (e.g., media influences, mainstreaming, day care, child abuse, effects of peers).

CPsy 4336W. Development and Interpersonal Relations. (4 cr; A-F only. Prereq–2301 or equiv, 4331)
Processes and functions of interactions with parents and peers; analysis of theory and research on developmental changes and influences.

CPsy 4341W. Perceptual Development. (4 cr. Prereq–2301)
Perceptual learning, development of sensory/perceptual processes.

CPsy 4343. Cognitive Development. (4 cr; A-F only. Prereq–2301)
Cognitive processes; relevant theory, research literature, and methodology.

CPsy 4345. Language Development and Communication. (4 cr; A-F only. Prereq–CPsy 2301)
Structure and function of language; factors influencing development; methodological problems, language scales, theories.

CPsy 4347. Senior Project. (2 cr; A-F only. Prereq–CPsy sr)
Current literature on self-selected developmental topic. Students write a literature review.

CPsy 4993. Directed Instruction in Child Psychology. (1-4 cr [max 8 cr]; S-N only. Prereq–4 cr CPsy, #)
Students serve as teaching assistants or peer advisers.

CPsy 4994. Directed Research in Child Psychology. (1-4 cr [max 8 cr]. Prereq–4 cr in CPsy, #, Δ)
Individual empirical investigation. Students help plan/implement scientific studies, gain experience/expertise in methodology of research.

CPsy 4994H. Directed Research in Child Psychology (Honors Thesis). (1-6 cr [max 6 cr]. Prereq–4 cr in CPsy, CPsy honors, #, Δ)
Individual empirical investigation. Students help plan/implement scientific studies while gaining experience/expertise in research methodology.

CPsy 4996. Field Study in Child Psychology. (1-4 cr [max 8 cr]; S-N only. Prereq–4 cr CPsy, #)
Independent reading. Varies depending on student's specific area of interest. Students receive credit while interning in metropolitan area.

Chinese (Chn)

Department of Asian Languages and Literatures

College of Liberal Arts

Chn 1011. Beginning Modern Chinese. (6 cr)
Speaking and reading modern standard Chinese through structured practice.

Chn 1012. Beginning Modern Chinese. (6 cr. Prereq–1011 or equiv or #)
Speaking and reading modern standard Chinese through structured practice.

Chn 1015. Accelerated Beginning Modern Chinese. (5 cr. §1011, §1012. Prereq–#)
Mandarin Chinese. Reading, writing, standard pronunciation.

Chn 1016. Accelerated Intermediate Modern Chinese. (5 cr. §3021, §3022. Prereq–1012 or 1015 or #)
Mandarin Chinese. Reading, writing, standard pronunciation.

Chn 3021. Intermediate Modern Chinese. (5 cr. Prereq–1012 or 1015 or equiv or #)
Modern standard Chinese skills developed further through conversations, writing, and reading.

Chn 3022. Intermediate Modern Chinese. (5 cr. Prereq–3021)
Modern standard Chinese skills developed further through conversation and reading.

Chn 3031. Advanced Modern Chinese. (4 cr. Prereq–3022 or equiv or #)
Reading and analysis of 20th-century texts.

Chn 3032. Advanced Modern Chinese. (4 cr. Prereq–3031 or equiv or #)
Reading and analysis of 20th-century texts.

Chn 3041. Business Chinese. (4 cr. Prereq–3032 or equiv or #)
Reading and analysis of commercial and business texts.

Chn 3111. Introductory Classical Chinese. (4 cr. Prereq–3022 or equiv or #)
Study of classical Chinese through reading and analysis of representative texts.

Chn 3112. Introductory Classical Chinese. (4 cr. Prereq–3111)
Study of classical Chinese through reading and analysis of representative texts.

Chn 3161. Media Cultures in Modern China. (3 cr. Prereq–Soph or higher; Chinese language not required, background in modern Chinese history recommended)
Relations among media technologies, cultural identities, and politics in China from 19th century to present. Emphasizes photography, graphic arts, popular music/recording. Some attention to cinema and popular fiction. Ways of analyzing popular/mass culture.

Chn 3166W. Chinese Film. (3 cr)
Survey of Chinese cinema from China (PRC), Taiwan, Hong Kong. Emphasizes global, social, economic, sexual, gender, psychological, other themes as represented through film.

Chn 3201. Chinese Calligraphy. (2 cr)
Appreciation and execution of Chinese calligraphy through guided practice.

Chn 3202. Intermediate Chinese Calligraphy. (2 cr. Prereq–3201 or #)
Advanced techniques of composing Chinese characters using regular style of Chinese calligraphy.

Chn 3900. Topics in Chinese Literature. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule*.

Chn 3920. Topics in Chinese Culture. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule*.

Chn 4011. Chinese Traditional Literature in Translation I. (4 cr)
Representative works of Chinese literature in translation from ancient times until the end of the T'ang dynasty.

Chn 4012W. Chinese Traditional Literature in Translation II. (4 cr)
Representative works of Chinese literature in translation from end of T'ang dynasty until end of 19th Century.

Chn 4023. 20th-Century Chinese Literature in Translation. (4 cr. Prereq–Background in modern Chinese history desirable; knowledge of Chinese language not required)
Main trends in Chinese literature from May 4th, 1919 to 1979, including Taiwanese literature.

Chn 4024. Contemporary Chinese Literature in Translation. (4 cr. Prereq–Background in modern Chinese history desirable; knowledge of Chinese language not required)
Main trends in Chinese literature from 1979 to the present.

Chn 4121. History of the Chinese Language. (4 cr. Prereq–3111)
Sources and methods in the study of the historical development of the Chinese language.

Chn 4125. Structure of Modern Chinese. (4 cr. Prereq–3022 or equiv or #)
Analysis of the grammatical structures of modern standard Chinese.

Chn 4234. Chinese Poetry in Translation. (4 cr. Prereq–No knowledge of Chinese required.)
Major themes, genres, and technical conventions of Chinese poetry from the classical age of poetry to the modern period.

Chn 4235. Chinese Fiction in Translation. (4 cr. Prereq–No knowledge of Chinese is required.)
An introduction to narrative and fictional traditions in pre-modern China.

Chn 4241. Filmic Construction of Modernity in China. (4 cr)
A survey of important films made after the Cultural Revolution with a special emphasis on the critically acclaimed "Fifth Generation" filmmakers.

Chn 4292. Directed Reading. (1-5 cr. Prereq–#, Δ, ❑)
Guided individual reading or study.

Chn 5011. Research Methods. (4 cr. Prereq–3032 or 3112)
Introduction to the sources and approaches of research in language and literature.

Chn 5015. Chinese Philosophical/Historical Texts. (4 cr. Prereq–3112)
Readings from major texts in Chinese philosophical and historical traditions.

Chn 5018. Chinese Religious Texts. (4 cr. Prereq–3112)
Traditional Chinese religious systems through selected texts.

Chn 5040. Readings in Chinese Text. (2-4 cr [max 12 cr]; A-F only. Prereq–3032 or equiv or #)
Students read authentic materials of various types to increase reading/speaking ability. Topics specified in *Class Schedule*.

Chn 5120. Topics in Chinese Linguistics. (4 cr [max 8 cr]. Prereq–4121 or 4125)
Studies of the structure and change in the Chinese language.

Chn 5230. Topics in 20th-Century Chinese Literature. (4 cr [max 8 cr]. Prereq–3032)
Studies of representative literary works from May 4, 1919 to the present.

Chn 5240. Topics in Chinese Poetry. (4 cr [max 8 cr]. Prereq–3112)
Selected major Chinese poets and poetic forms.

Chn 5242W. Chinese Classical Drama and Theatre. (4 cr)
A multimedia course on traditional Chinese theatre.

Chn 5250. Topics in Chinese Fiction. (4 cr [max 8 cr]. Prereq–3032 or 3112)
Studies of traditional and modern Chinese fiction.

Chn 5260. Topics in Pre-modern Chinese Prose. (4 cr [max 8 cr]. Prereq–3112)
Studies of representative Chinese prose writings of the pre-modern period.

Chn 5393. Directed Study. (1-5 cr [max 18 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Civil Engineering (CE)

Department of Civil Engineering

Institute of Technology

CE 0005. Refresher Course for Civil Engineers. (0 cr; S-N only. Prereq–BCE or equivalent degree or completion of Parts I and II of the State Bouad Examination)

CE 1101. Civil Engineering Orientation. (1 cr; S-N only)
Introduction to the Civil Engineering Department and civil engineering practice. Presented by faculty members and professional engineers.

CE 3101. Computer Applications in Civil Engineering I. (3 cr; A-F only. Prereq–Math 1272, [CE or GeoE or MatS] student)
Introduction to computer tools/methods for solving civil engineering problems. Spreadsheets, Autocad, Mathcad, Visual Basic. Numerical integration, curve fitting, linear/nonlinear equations, differential equations.

CE 3111. CADD for Civil Engineers. (2 cr; A-F only. Prereq–3201)
Introduction to AutoCAD and land development desktop software. Students complete all tasks to design two-lane roadway using civil engineering design software, including topography, plan/profile, contours, cross sections, and quantity calculations.

CE 3201. Transportation Engineering. (3 cr. Prereq–Phys 1301)
Apply laws of motion to describe vehicle performance and determine constraints for highway designs. Traffic flow principles and their relation to capacity and level of service. Introduction to geometric design, pavement design, and transportation planning.

CE 3202. Surveying and Mapping. (2 cr; A-F only. Prereq–IT or #; Math 1271, 1272)
Theory of precision measurements of distance, elevation, angle, and direction of points and lines above, on, or beneath the earth's surface; establishing such points or lines. Elements of coordinate systems, datum planes, and maps.

CE 3301. Soil Mechanics I. (3 cr; A-F only. Prereq–IT, AEM 3031)
Index properties and soil classification. Effective stress. Permeability and seepage. Elasticity theory. One-dimensional compression and consolidation; settlements. Compaction; cut and fill problems.

CE 3311. Rock Mechanics I. (3 cr; A-F only. Prereq–IT, AEM 3031)
Classifications and index properties. Behavior of intact rock and rock masses. Failure criteria. Stereographic projections; kinematic analysis of slopes. Reinforcement. Foundations.

CE 3401. Linear Structural Analysis. (3 cr; A-F only. Prereq–Grade of at least C- in AEM 3031, IT)
Analysis of determinate/indeterminate trusses and frames and of deformation by virtual work. Application of energy, slope-deflection, and moment distribution methods to indeterminate structures. Influence lines. Design.

CE 3402. Construction Materials. (3 cr; A-F only. Prereq–grade of at least C- in AEM 3031, IT)
Basic concepts of behavior mechanisms for construction materials such as concrete, metals, asphalt, plastics, and wood. Standard specifications for material properties. Techniques for testing.

CE 3406. Construction Materials for Managers. (3-4 cr; A-F only. Prereq–[AEM 2011 or WPS 4301], construction management major)
Basic concepts of physical properties and behavior mechanisms for construction materials such as concrete, steel, aluminum, and wood. Standard specifications for material properties. Laboratory techniques for evaluation of each material.

CE 3501. Environmental Engineering. (3 cr; A-F only. Prereq–Chem 1022, Phys 1302)
Introduction to environmental engineering. Quantitative approach to environmental problems. Scientific background for understanding roles of engineers and scientists.

CE 3502. Fluid Mechanics. (4 cr; A-F only. Prereq–[AEM 2012 or AEM 3031], Math 2373, [IT or ForP major])
Fluid statics/dynamics. Kinematics of fluid flow, equations of motion, pressure-velocity relationships, viscous effects, boundary layers. Momentum/energy equations. Lift/drag. Flow in pipes and pipe systems. Hydraulic machinery. Fluid measurements.

CE 4101W. Project Management. (3 cr. Prereq–Upper div IT)
Survey of broad areas in engineering project management and economics. Project planning, scheduling, and controlling; budgeting, staffing, task and cost control; communicating with, motivating, leading, and managing conflict among team members; engineering economics.

CE 4102W. Capstone Design. (3 cr; A-F only. Prereq–3201, 3202, 3301, 3401, 3402, 3501, 3502)
Teams formulate/solve civil engineering problems. From conceptual stage through preliminary planning, public hearings, design, environmental impact statements, final plans/specifications, and award of contracts.

CE 4111. Engineering Systems Analysis. (3 cr. Prereq–Upper div IT)
"Systems" approach to problems. Operations research—decision engineering, network analysis, simulation, linear programming, and expert systems—is used to represent systems and assess trade-offs.

CE 4121. Computer Applications in Civil Engineering II. (3 cr; A-F only. Prereq–CE or upper div GeoE, 3101, Math 2243, Math 2263)
Advanced application of computer tools and methods in solving partial differential equations from civil engineering problems. The major tools are Spreadsheet and Visual Basic programming. Methods include finite differences, boundary element, finite element, and control volume finite element.

CE 4170. Independent Study I. (1-4 cr [max 4 cr]. Prereq–#)
Special studies in planning, designing, or analyzing civil engineering systems. Lab problems, literature studies, or reports supervised by staff.

CE 4180. Independent Study II. (1-4 cr [max 4 cr]. Prereq–#)
Special studies in the planning, design, or analysis of civil engineering systems. Individual lab research problems, literature studies, reports. Supervised by staff.

CE 4190. Engineering Co-op Assignment. (2-6 cr; S-N only. Prereq–Upper div CE, approval of department co-op director)
Formal written report of work during six-month professional assignment.

CE 4201. Highway Design. (3 cr; A-F only. Prereq–CE or upper div GeoE or grad, 3202, 3201 or #)
Vertical and horizontal alignment, earthwork computations, highway capacity, forecast of traffic volume demand, impact of vehicle type on geometric design, intersection design.

CE 4231. Pavement Engineering. (3 cr. Prereq–Upper div IT, CE 3201, CE 3301, CE 3402 or #)
Concepts and principles in rigid and flexible pavement design. Traffic loads, soil considerations, and material characteristics for highway and airfield pavement design.

CE 4232. Cemented Materials. (3 cr. Prereq–Upper div IT or Grad, CE 3402 or #)
Characteristics of and lab testing for mineral aggregates: cement, mortar, fresh/hardened concrete, and asphalt-cement mixtures. Construction and long-term performance of mixtures.

CE 4301. Soil Mechanics II. (3 cr; A-F only. §GeoE 4301. Prereq–[[3301 or GeoE 3301], upper div IT] or #)
Traction and stress. Mohr-Coulomb failure criterion. Experiments on strength and on angle of internal friction. Earth pressure theories, rigid/flexible retaining walls. Bearing capacity of shallow foundations. Stability of slopes.

CE 4311. Rock Mechanics II. (3 cr; A-F only. Prereq–Upper div IT or grad in IT major, CE 3311, GeoE 3311 or #)
Failure mechanisms in rock masses. Elasto-plastic solutions applied to underground excavations. Design of linings and support systems; rock-support interaction. In situ stresses and excavation shape. Instrumentation and monitoring.

CE 4341. Engineering Geostatistics. (3 cr; A-F only. Prereq–CE, GeoE or upper div Geo or grad, Stat 3021 or #)
Problem solving and decision making in civil and geological engineering using applied statistics. Emphasizes spatially correlated data, e.g., geologic site characterization, spatial sampling design.

CE 4351. Groundwater Mechanics. (3 cr; A-F only. Prereq–Upper div IT or grad, CE 3502 or #)
Shallow confined and unconfined flows. Two-dimensional flow in vertical plane, transient flow. Flow toward wells. Determination of streamlines and pathlines in two and three dimensions. Introduction to contaminant transport. Elementary computer modeling.

CE 4352. Groundwater Modeling. (3 cr; A-F only. Prereq–Upper div IT or grad, CE 4351, GeoE 4351 or #)
Analytic element method. Mathematical and computer modeling of single and multiple aquifer systems. Field problems. Theory and application of contaminant transport models, including capture zone analysis.

CE 4401. Steel and Reinforced Concrete Design. (4 cr; A-F only. Prereq–Grade of at least C- in 3401, ¶3402, [upper div IT or grad student])
Limit-states design. Steel: tension, compression, flexure, combined compression/flexure, connections. Concrete: beams in flexure/shear, one-way slabs, T-beams, development length, serviceability.

CE 4411. Matrix Structural Analysis. (3 cr; A-F only. Prereq–[Grade of at least C- in 3401, [upper div IT or grad student]] or #)
Analysis of linear structural systems by matrix methods, stiffness, and flexibility methods. Introduction to computerized structural analysis of trusses/frames, including coding in programming language.

CE 4412. Reinforced Concrete Design II. (3 cr; A-F only. Prereq–[Grade of at least C- in 4401, [upper div IT or grad student]] or #; 4411 recommended)
Advanced design of reinforced concrete structures: footings, retaining walls, columns with slenderness effects and biaxial loading, torsion, continuous systems, two-way floor systems.

CE 4413. Steel Design II. (3 cr; A-F only. Prereq–[Grade of at least C- in 4401, [upper div IT or grad student]] or #; 4411 recommended)
Design of steel and composite steel/concrete structures, including multistory frames and plate-girders bridges. Beam-columns, torsion, connections, frames.

CE 4501. Hydrologic Design. (4 cr; A-F only. Prereq–3502)
Hydrologic cycle: precipitation, evaporation, infiltration runoff. Flood routing through rivers and reservoirs. Statistical analysis of hydrologic data and estimation of design flows. Open channel flow, flow through conduits. Detention basin design, hydraulic structure sizing, estimation of risk of flooding.

CE 4502. Water and Wastewater Treatment. (3 cr; A-F only. Prereq–3501)
Theory of chemical, physical, and biological processes in treating water and wastewater. Sequencing of processes. Design of treatment facilities.

CE 4511. Hydraulic Structures. (4 cr; A-F only. Prereq–4501)
Hydraulic design procedures for culverts, dams, spillways, outlet works, and river control works. Drop structures, water intakes, bridge crossings. Offered alt yrs.

CE 4512. Open Channel Hydraulics. (4 cr; A-F only. Prereq–IT or grad, 3502 or #)
Theories of flow in open channels, including gradually varied and rapidly varied flows, steady and unsteady flows. Computational methods for unsteady open channel flows, applications to flood routing. Introduction to moveable bed mechanics.

CE 4531. Environmental Process Engineering. (3 cr; A-F only. Prereq–3501, ¶4541)
Physical principles that influence behavior of engineered and natural environmental systems. Flow behavior through reactors, mass transfer, interfacial effects, stability, kinetics.

CE 4541. Environmental Water Chemistry. (4 cr; A-F only. Prereq–3501, Chem 1021, Chem 1022)
Introduction to water chemistry. Physical chemical principles, geochemical processes controlling chemical composition of waters, and behavior of contaminants that affect the suitability of water for various uses. Analytical procedures to measure chemical composition.

CE 4551. Environmental Microbiology/Lab. (4 cr; A-F only. Prereq–Upper div, 3501)
Role of microorganisms in environmental bioremediation, pollution control, water and wastewater treatment, biogeochemistry, and human health. Basic microbiological techniques: isolation, identification and enumeration of bacteria, BOD, biodegradation kinetics, and disinfection. Lecture plus three hrs weekly lab.

CE 4561. Solid Hazardous Wastes. (3 cr. Prereq–IT or grad, Chem 1022, 3501 or #)
Solid and hazardous waste characterization; regulatory legislation; waste minimization; resource recovery; chemical, physical, and biological treatment; thermal processes; disposal practices. Analysis and design of systems for treatment and disposal.

CE 4562. Environmental Remediation Technology. (3 cr; A-F only. Prereq–[3501, 4501] or #)
Technologies designed for removal of pollutants from groundwater and soils. Advances in technological design. Emerging technologies such as in situ bioremediation, phytoremediation. Role of environmental biotechnology in pollution abatement.

CE 5170. Internet Based Study. (1-5 cr [max 15 cr]; A-F only. Prereq–Upper div IT)
Internet based teaching with bi-weekly exercises on topic of concern.

CE 5180. Special Topics. (1-4 cr [max 4 cr]; A-F only. Prereq–#)
Topics vary depending on faculty and student interests.

CE 5211. Traffic Engineering. (3 cr. Prereq–3201, Stat 3021 or equiv)
Principles of vehicle and driver performance as they apply to the safe and efficient operation of highways. Design and use of traffic control devices. Capacity and level of service. Trip generation and traffic impact analysis. Safety and traffic studies.

CE 5212. Urban Transportation Planning. (3 cr. Prereq–3201 or equiv)
Techniques of analysis and planning for transportation services; demand-supply interactions; evaluating transportation alternatives; travel demand forecasting; integrated model systems; citizen participation in decision-making.

CE 5214. Transportation Systems Analysis. (3 cr. Prereq–3201)
Systems approach, its application to transportation engineering/planning. Prediction of flows and level of service. Production functions, cost optimization, utility theory, demand modeling, transportation network analysis, equilibrium assignment, decision analysis, multidimensional evaluation of transportation projects.

CE 5231. Pavement Management and Rehabilitation. (3 cr. Prereq–Upper div IT or grad, CE 4231 or #)
Concepts and practices in monitoring, maintaining, and rehabilitating flexible and rigid pavement systems. Manual and automated means of pavement assessment, structural and functional definitions of pavement performance, decision-making processes, and optimization.

CE 5232. Advanced Portland Cement Concrete. (3 cr. Prereq–Upper div IT or Grad, CE 4232 or #)
Advanced topics in cement chemistry and selection of materials for and design of portland cement concrete mixtures. Lab assignments pertaining to mixture design and short-term and long-term behavior. Use of admixtures and fiber reinforcement. Effects of proportionment of standard materials.

CE 5233. Advanced Bituminous Materials. (3 cr. Prereq–Upper div IT or grad, CE 3402 or #)
Advanced topics in selection and design of bituminous materials. Asphalt cement, rheology, emulsions, chip seals, hot-mix asphalt design, viscoelastic characterization. Lab assignments pertaining to rheology, mixture design and viscoelastic behavior.

CE 5311. Experimental Geomechanics. (3 cr; A-F only. Prereq–Upper div IT or grad, 4301, GeoE 4301 or #)
Machine stiffness, closed-loop testing. Small-strain theory. Measurement of deformation: strain gages, LVDTs, accelerometers, and associated circuits. Direct and indirect testing. Material behavior: experiments on anisotropic, damaged, and fluid-filled solids.

CE 5321. Geomechanics. (3 cr; A-F only. Prereq–Upper div IT or grad, 4301 or GeoE 4301)
Elasticity theory and solution of elastic boundary value problems. Wave propagation in unbounded elastic media. Elements of fracture mechanics and applications. Elements of poroelasticity and applications.

CE 5331. Geomechanics Modeling. (3 cr; A-F only. Prereq–Upper div IT or grad, 4301 or #)
Soil and rock response in triaxial testing; drained and undrained behavior; elastic and plastic properties. Modeling stresses, strains, and failure in geomechanics problems.

CE 5411. Applied Structural Mechanics. (3 cr; A-F only. Prereq–[Grade of at least C- in 4401, [upper div IT or grad student]] or #)
Principal stresses and failure criteria in 3 dimensions. Introduction to plane elasticity, energy methods, torsion of beams, and bending of unsymmetrical beams.

CE 5412. Prestressed Concrete Design. (3 cr; A-F only. Prereq–[Grade of at least C- in 4401, [upper div IT or grad student]] or #; 4412 recommended)
Design of prestressed concrete structures. Time dependent effects, behavior, flexure, shear, torsion, deflections, continuous systems.

CE 5413. Masonry Structures. (3 cr; A-F only. Prereq–[Grade of at least C- in 3401, [upper div IT or grad student]] or #; 4401 recommended)
Masonry materials and their production. Mortars, grouts. Design of unreinforced, reinforced, and prestressed masonry structural systems. Walls, columns, lintels, arches. Codes/specifications, testing, inspection.

CE 5431. Wave Methods for Nondestructive Testing. (4 cr; A-F only. §GeoE 5431. Prereq–[AEM 2021, AEM 3031] or #)
Introduction to contemporary methods for nondestructive characterization of objects of civil infrastructure (e.g., highways, bridges, geotechnical

sites). Imaging technologies based on propagation of elastic waves such as ultrasonic/resonant frequency methods, seismic surveys, and acoustic emission monitoring. Lecture, lab.

CE 5541. Environmental Water Chemistry. (3 cr; A-F only. Prereq–3501, Chem 1021, Chem 1022)
Introduction to water chemistry. Physical chemical principles, geochemical processes controlling chemical composition of waters, behavior of contaminants that affect the suitability of water for beneficial uses.

CE 5542. Experimental Methods in Environmental Engineering. (3 cr; A-F only. Prereq–3501, Chem 1021, Chem 1022)
Tools necessary to conduct research in environmental engineering and chemistry. Theory of operation of analytical equipment. Sampling and data handling methods, statistical analyses, experimental design, laboratory safety. Lecture, laboratory.

CE 5551. Environmental Microbiology Laboratory. (4 cr; A-F only. Prereq–3501, [upper div or grad] student)
Role of microorganisms in environmental bioremediation, pollution control, water/wastewater treatment, biogeochemistry, and human health. Basic microbiological techniques: isolation, identification/enumeration of bacteria, BOD, biodegradation kinetics, disinfection. Lecture, lab.

CE 5581. Water Resources: Individuals and Institutions. (3 cr; A-F only)
Control of water resources by natural system functions, user actions, and influence of social, economic, and political institutions. Water resource policy in the United States. Case studies (e.g., flood/drought management).

CE 5591. Environmental Law for Engineers. (3 cr; A-F only. Prereq–upper div IT or grad or #)
Environmental regulatory law relevant to civil and environmental engineering; specific provisions of federal statutory and regulatory laws such as NEPA, CWA, RCRA, CAA, and CERCLA.

Classical Civilization (ClCv)

Department of Classical and Near Eastern Studies

College of Liberal Arts

CLCV 1201. The Olympic Games. (3 cr)
Surveys the Olympic Games (776 B.C. to A.D. 338) and other ancient athletic festivals, including those for women participants. Greek art and literature serve as basic sources. Comparisons are made with modern athletic events.

CLCV 3201. The Olympic Games. (3 cr)
The Olympic Games (776 B.C. to A.D. 338) and other ancient athletic festivals, including those for women participants. Greek art and literature serve as basic sources. Comparisons are made with modern athletic events.

CLCV 3340. Practicum in Archaeological Field and Computer Techniques. (3 cr. Prereq–ClCv major or # or one course in ancient art and archaeology)
Methods used for excavation of Old and New World sites. Meets at archaeometry/computer lab for part of the semester and at a selected site in Minnesota for day-long sessions for 9 to 10 weeks.

CLCV 3510. Great Books. (3 cr [max 9 cr]. Prereq–Jr or sr or #)
Intensive study of major works of classical antiquity and later (written in or translated into English), related by kind, theme, style, or perspective. Sometimes including works from non-Western cultures.

CLCV 3711. Classics of Literary Criticism. (3 cr. Prereq–1 course in literature, 2nd course in literature or philosophy or #)
Principles of criticism as expounded and employed in major critical works by writers such as Plato, Aristotle, Horace, Longinus, Sir Philip Sidney, John Dryden, Samuel Johnson, David Hume, William Wordsworth, Samuel Taylor Coleridge, and T. S. Eliot.

CLCV 3940. Proseminar: Classical Traditions in Western Culture. (3-4 cr [max 6 cr]. Prereq–ClCv major or #)
The nature of Greco-Roman classical traditions manifested in various cultural spheres: language and literature, fine arts, history, science, philosophy, theology, and other disciplines; the political, social, educational, and religious life of society. The perspective, scope, breadth, and depth of the course will vary.

CLCV 3950. Topics in Classical Civilization. (3-4 cr [max 9 cr])
Topics specified in the *Class Schedule*.

CLCV 3993–3996. Directed Studies in Classical Civilization. (1-4 cr)

Classics (Clas)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Clas 1001. Ancient Greece: Poet and Hero in the Age of Homer. (3 cr)
Homer and his epic poetry; Trojan war; Greek lyric poets (Sappho and Pindar); early Greek philosophy.

Clas 1002. Ancient Greece: The Golden Age of Athens. (3 cr)
Emergence of democracy in shadows of two brutal wars: one foreign, one civil. Democracy, war, empire through lens of tragedy, comedy, art from 5th-century Athens.

Clas 1003. Ancient Greece: Alexander and the East. (3 cr)
Achievements of Alexander the Great and their effect on the Greek-speaking world; Greek colonization of Egypt; Hellenistic art, literature, and philosophy.

Clas 1004. Ancient Rome: Power, Politics, and the Roman Republic. (3 cr)
The Roman Republic from its origins to Caesar's death.

Clas 1005. Ancient Rome: The Roman Revolution. (3 cr)
Transition from republic to empire; political strategies of Augustus (the first emperor). "Golden age" of Latin literature; the monuments.

Clas 1006. Ancient Rome: The Age of Nero. (3 cr)
The Roman Empire. "Silver age" of Latin literature, rise of Christianity. Art/architecture.

Clas 1023. The Age of Constantine the Great. (3 cr. §3023)
Change/continuity in Roman Empire from second-century zenith to third-century crisis, first Christian emperor (AD 306 to 337), and beyond. Replacement of classical paganism by Christianity. Beginnings of monasticism. Superpower relations between Roman, Persian empires.

Clas 1024. The Age of St. Augustine of Hippo. (3 cr. §3024)
Cultural diversity (A.D. 363 to circa A.D. 500). Replacement of Roman Empire in Western Europe by barbarian kingdoms, consolidation of Constantinople as capital in the East. Literature, art, thought resulting from new dominance of Christianity, particularly Augustine of Hippo. Meets with 3024.

Clas 1042. Greek and Roman Mythology. (4 cr)
Introduction to the stories and the study of Greek and Roman mythology.

Clas 1042H. Honors Course: Greek and Roman Mythology. (4 cr. Prereq–Honors or #)
Introduction to stories/study of Greek/Roman mythology.

Clas 1043. Classical Archaeology: Introduction to the Archaeology of Ancient Greece and Rome. (4 cr)
Role that material culture, including art and architecture, plays in forming our picture of the Classical past. Relationship between archaeology and other disciplines dealing with the past. Study of selected sites considers the motives and methods of research and how the results are used by archaeologists and the general public.

Clas 1045. Etymology: Word Study in the Sciences and Humanities. (3 cr)
English prefixes, suffixes and roots from Greek and Latin are taught through computer-assisted instruction; techniques of word analysis. Historical overview of Greek and Latin; their relationship with and influence on English.

Clas 1082. Jesus in History. (3 cr)
Jesus of Nazareth in his original setting. Modern approaches to the historical Jesus. Perspectives and needs of early gospel writers and effects on portrayals of Jesus. Shifting representations of Jesus in new historical and cultural situations. Meets with Clas 1182.

Clas 1082H. Honors Course: Jesus in History. (4 cr. §1082, §1182, §RelA 1082, §RelA 1182. Prereq–Honors)
Jesus of Nazareth in his original setting. Modern approaches to the historical Jesus. Perspectives, needs of early gospel writers. Effects of portrayals of Jesus. Shifting representations of Jesus in new historical/cultural situations. Meets with 1082.

Clas 1083. Jesus the Jew. (3 cr. §3083, §RelA 1083, §RelA 3083, §JwSt 1083, §JwSt 3083)
Historic figure of Jesus within context of first century Palestinian Judaism. Main groups/institutions of Judaism at time of Jesus. Rabbinic literature/traditions. Works describing Jesus' life/sayings (synoptic gospels). Jesus and the Law, Messianic ideals/expectations, problem of religious authority. Positions regarding Rome, its authority. James and the Jerusalem Church.

Clas 1148. Technical Terminology for the Health Professions. (3 cr)
Greek and Latin prefixes, suffixes, and roots basic to the vocabulary of health professions; taught through computer-assisted instruction.

Clas 3001W. Classical Lyric and Satire. (3 cr)
Greek and Roman lyric poetry; Roman satire.

Clas 3008. History of Ancient Art. (3 cr)
Architecture, sculpture, and painting of selected early cultures; emphasis on influences on the development of Western art.

Clas 3023. The Age of Constantine the Great. (3 cr. §1023)
Change/continuity in Roman Empire from its 2nd-century zenith through 3rd-century crisis, first Christian emperor (306 to 337 A.D.), and beyond. Replacement of classical paganism by Christianity. Beginnings of monasticism. Superpower relations between Roman, Persian empires. Meets with 1023.

Clas 3024. The Age of St. Augustine of Hippo. (3 cr. §1024)
Cultural diversity (A.D. 363 to circa 500 A.D.). Replacement of Roman Empire in Western Europe by barbarian kingdoms, consolidation of Constantinople as capital in the East. Literature, art, thought resulting from new dominance of Christianity, particularly Augustine of Hippo. Meets with 1024.

Clas 3035. Classical Myth in Western Art. (4 cr)
An exploration of the role of myth in the visual arts through examination of major figures and stories that became popular in the ancient world and have fascinated artists and audiences ever since.

Clas 3070. Topics in Ancient Religion. (3 cr)
Study of a specific aspect of religion in Classical and Near Eastern antiquity such as healing cults, magic and divination, Gnosticism, or prophecy and authority. Topics specified in the *Class Schedule.*

Clas 3071. Greek and Hellenistic Religions. (3 cr)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Homer and Olympian deities; ritual performance; prayer and sacrifice; temple architecture; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions.

Clas 3072. The New Testament. (3 cr)
Early Jesus movement in its cultural and historical setting. Origins in Judaism; traditions about Jesus. The apostle Paul, his controversies and interpreters. Questions of authority, religious practice, and structure; emergence of the canon of scripture. Contemporary methods of New Testament study; biblical writings as history and narrative.

Clas 3072H. Honors Course: The New Testament. (4 cr. §3072. Prereq–3172, RelA 3072, RelA 3172, honors)
Early Jesus movement in its cultural/historical setting: origins in Judaism; traditions about Jesus; Paul, his controversies/interpreters; questions of authority, religious practice, structure; emergence of canon. Contemporary methods of New Testament study; biblical writings as history/narrative. Meets with 3072. Honors students meet weekly for recitation section.

Clas 3073. Roman Religion and Early Christianity. (3 cr)
Etruscan, Republican religion. Appeal of non-Roman cults. Ruler worship. Christians in Asia Minor, Egypt, and the West. Popular piety, Christian and non-Christian. Rabbinic Judaism. Varieties of Christianity in 2nd and 3rd centuries. Influence of Greco-Roman culture on emerging church. Constantine and Julian.

Clas 3081W. Classical Epic in Translation. (3 cr. §5081)
Homer's Iliad and Odyssey; Virgil's Aeneid; cultural context of epic; development of the hero; epic style; poetics of epic.

Clas 3082W. Greek Tragedy in Translation. (3 cr)
Origins of tragedy; ancient theatres; selected plays of Aeschylus, Sophocles and Euripides.

Clas 3083W. Ancient Comedy. (3 cr)
Greek/Roman comic drama (e.g., Aristophanes, Menander, Plautus, Terence).

Clas 3088. Archaeology in Biblical Lands I: Old Testament Period. (3 cr)
Archaeological data relevant to the Old Testament; major sites in the Holy Land and other areas of the Mediterranean and Near East. Evidence of pottery, inscriptions, manuscripts, and coins. Excavation methods. Archaeology as a tool for study of ancient religions.

Clas 3089. Archaeology in Biblical Lands II: New Testament Period. (3 cr)
Archaeological data relevant to the New Testament; major sites in the Holy Land and other areas of Mediterranean and Near East. Evidence of pottery, inscriptions, manuscripts, and coins. Excavation methods. Archaeology as a tool for study of ancient religions.

Clas 3142. Art of Egypt. (4 cr)
Arts and architecture of Egypt from prehistoric times to the emergence of modern Egypt, with emphasis on the elements of continuity and of change that have shaped Egyptian culture.

Clas 3145. Advanced Greek and Roman Mythology. (3 cr. Prereq–1042 or #)
Study of the different theoretical explanations of Greek and Roman mythology.

Clas 3152. Art and Archaeology of Ancient Greece. (4 cr)
Introduction to the civilization of ancient Greece as revealed through art and material culture. Case studies of selected monuments and sites.

Clas 3162. Roman Art and Archaeology. (4 cr)
Introduction to the art and material culture of the Roman World: origin, change and continuity, "progress" or "decay" in the later Empire, and its legacy to the modern world.

Clas 3173. Honors Course: Roman Religion and Early Christianity. (4 cr)
Etruscan, Republican religion. Appeal of non-Roman cults. Ruler worship. Christians in Asia Minor, Egypt and the West. Popular piety, Christian and non-Christian. Rabbinic Judaism. Varieties of Christianity in 2nd and 3rd centuries. Influence of Greco-Roman culture on emerging church. Constantine and Julian. Honors recitation meets once a week for an additional recitation section. Meets with RelA 3173.

Clas 3201. The Olympic Games. (3 cr)
Surveys the Olympic Games (776 B.C. to A.D. 338) and other ancient athletic festivals, including those for women participants. Greek art and literature serve as basic sources. Comparisons are made with modern athletic events.

Clas 3340. Practicum in Archaeological Field and Computer Techniques. (3 cr. Prereq–ClCv major or # or 1 course in ancient art and archaeology)
Methods used for excavation of Old and New World sites. Meets at archaeometry/computer lab for part of the semester and at a selected site in Minnesota for day-long sessions for 9 to 10 weeks.

Clas 3940. Topics in Classical Literature. (3 cr [max 9 cr]. Prereq–Two literature courses or #)
Selected topics (e.g., ancient novel, pastoral, biography, thematic studies). Specified in *Class Schedule.*

Clas 3950. Aspects of Classical Culture. (3 cr)
Selected topics in the cultural history of classical antiquity (e.g., women in antiquity, Roman diplomacy, slavery, education). Topics specified in *Class Schedule.*

Clas 3993. Directed Studies. (1-4 cr [max 18 cr])
Guided individual reading or study.

Clas 5001. Classical Lyric and Satire. (3 cr. Prereq–¶3001, two literature courses or #)
Greek and Roman lyric poetry; Roman satire.

Clas 5013. Roman Law and Society. (3 cr)
Survey of Roman law from social and historical perspectives. Basic concepts of Roman private law and legal procedure.

Clas 5070. Topics in Ancient Religion. (3 cr. Prereq–RelA 3071 or 3072 or 3073 or 5071 or 5072 or 5073 or any RelS course or #)
Study of a specific aspect of religion in Classical and Near Eastern antiquity such as healing cults, magic and divination, Gnosticism, or prophecy and authority. Topics specified in *Class Schedule.*

Clas 5071. Greek and Hellenistic Religions. (3 cr. §3071)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Homer and Olympian deities; ritual performance; prayer and sacrifice; temple architecture; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions. Meets with 3071.

Clas 5072. The New Testament. (3 cr. §3072)
Early Jesus movement in its cultural and historical setting. Origins in Judaism; traditions about Jesus. Apostle Paul, his controversies and interpreters. Questions of authority, religious practice, and structure; emergence of the canon of scripture. Contemporary methods of New Testament study; biblical writings as history and narrative. Meets with 3072.

Clas 5073. Roman Religion and Early Christianity. (3 cr. §3073)
Etruscan, Republican religion. Appeal of non-Roman cults. Ruler worship. Christians in Asia Minor, Egypt, and the West. Popular piety, Christian and non-Christian. Rabbinic Judaism. Varieties of Christianity in 2nd and 3rd centuries. Influence of Greco-Roman culture on emerging church. Constantine and Julian. Meets with 3073.

Clas 5080. New Testament Proseminar. (3 cr. Prereq–1082 or 3072 or equiv)
Study of some specific aspect of the New Testament and related literature. The class is organized as a discussion seminar. Topics specified in *Class Schedule.*

Clas 5081. Classical Epic in Translation. (3 cr. §3081)
Homer's Iliad and Odyssey; Virgil's Aeneid; cultural context of epic; development of the hero; epic style; poetics of epic.

Clas 5082W. Greek Tragedy in Translation. (3 cr. §3082)
Origins of tragedy; ancient theatres; selected plays of Aeschylus, Sophocles and Euripides.

Clas 5083. Ancient Comedy. (3 cr. §3083)
Greek/Roman comic drama (e.g., Aristophanes, Menander, Plautus, Terence).

Clas 5085. Greek Philosophy: The Pre-Socratics to Plato. (3 cr)
Fragments of the pre-Socratics and Sophists and selected dialogues of Plato.

Clas 5088. Archaeology in Biblical Lands I: Old Testament Period. (3 cr. §3088)
Archaeological data relevant to the Old Testament; major sites in the Holy Land and other areas of the Mediterranean and Near East. Evidence of pottery, inscriptions, manuscripts, and coins. Excavation methods. Archaeology as a tool for study of ancient religions. Meets with 3088.

Clas 5089. Archaeology in Biblical Lands II: New Testament Period. (3 cr. §3089)
Archaeological data relevant to Jewish scriptures and New Testament; major sites in the Holy Land and other areas of the Mediterranean and Near East. Evidence of pottery, inscriptions, manuscripts, and coins. Excavation methods. Archaeology as a tool for study of ancient religions. Meets with 3089.

Clas 5103. Hellenistic and Early Roman Art and Archaeology. (3 cr. Prereq–Jr, Clas/ArtH 3008 or #)
Sculpture, architecture, painting, and topography in developing centers of Hellenistic culture in eastern Mediterranean and in Etruscan and Roman towns from 400 B.C. to the beginnings of the Roman Empire.

Clas 5108. Greek Architecture. (3 cr. Prereq–Jr, Clas/ArtH 3008 or #)
Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Asia Minor and Italy.

Clas 5111. Prehistoric Art and Archaeology of Greek. (3 cr. Prereq–Jr, Greek art or archaeology course or #)
Artistic and architectural forms of Neolithic period in Aegean area and Cycladic, Minoan, and Mycenaean cultures. Aims and methods of modern field archaeology; the record of human habitation in the Aegean area. Archaeological evidence as a basis for historical reconstruction.

Clas 5112. Archaic and Classical Greek Art. (3 cr. Prereq–Jr, Clas/ArtH 5111)
Sculpture, painting, architecture and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture; archaeological problems such as identifying and dating buildings; analysis of methods and techniques. Emphasis on Periklean Athens.

Clas 5120. Field Research in Archaeology. (3 cr. Prereq–#)
Field excavation, survey, and research at archaeological sites in the Mediterranean area. Techniques of excavation and exploration; interpretation of archaeological materials.

Clas 5145. Advanced Greek and Roman Mythology. (3 cr. §3145. Prereq–1042 or #)
Different theoretical approaches to Greek/Roman mythology.

Clas 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr. Prereq–Intro art history course or #)
The architecture, painting, and sculpture of urban houses, country estates, and tombs in the Roman world. Relationships between public and private spheres, and literary and physical evidence; usefulness of the physical evidence in illuminating gender roles.

Clas 5182. Art and the State: Public Art in the Roman Empire. (3 cr. Prereq–Intro art history course or #)
Origins of Roman public art; use in maintaining community; exploitation by the first emperor, Augustus; development and diffusion through the later empire; varying capabilities to adjust to the demands of a Christian Empire.

Clas 5251. Archaeology of Herodian Israel. (3 cr; A-F only. Prereq–One course in [archaeology or ancient history] or grad student)
Archaeological sites in Israel dating to era of Herod the Great (37-4 BC). Palaces and religious edifices. Remains from Jewish/gentile settlements throughout the kingdom. Course readings consist of contemporary literary sources and excavation reports.

Clas 5252. History of Early Christian Art in Context. (3-4 cr. Prereq–3xxx art history course or #)
Role played by art in the formation of early Christian and Byzantine communities, and in establishing their relationships with the Pagan world and early Islam.

Clas 5340. Practicum in Archaeological Field and Computer Techniques. (3 cr. §3340. Prereq–ClCv major or ancient art and archaeology course or #)
Methods used for excavation of Old and New World sites. Meets at archaeometry/computer lab for part of the semester and at a selected site in Minnesota for day-long sessions for 9 to 10 weeks. Meets with 3340.

Clas 5794. Introduction to Classical and Near Eastern Studies. (1 cr; S-N only. Prereq–Grad major or minor or #)
Introduction to core research materials and reference materials in the various disciplines which make up classical studies.

Clas 5940. Topics in Classical Literature. (3 cr [max 9 cr]. §3940. Prereq–Two literature courses or #)
Additional work for graduate credit. Topics specified in *Class Schedule.* Meets with 3940.

Clas 5950. Aspects of Classical Culture. (3 cr. §3950)
Topics specified in *Class Schedule.* Meets with 3950.

Clas 5993. Directed Studies. (1-4 cr. Prereq–#, Δ, ❑)
Guided individual reading or study.

Clas 5994. Directed Research. (1-12 cr. Prereq–#, Δ, ❑)

Clas 5996. Directed Instruction. (1-12 cr. Prereq–#, Δ, ❑)

Clinical Laboratory Science (CLS)

Department of Laboratory Medicine and Pathology

Medical School

CLS 5064. Introduction to Clinical Immunohematology. (2 cr; A-F only. Prereq–#)
Principles of blood grouping, antibody identification, compatibility testing, serology, and immunology.

CLS 5065. Introduction to Clinical Immunohematology: Laboratory. (2 cr; A-F only. Prereq–#)
Exercises illustrating techniques in blood grouping, antibody identification, compatibility testing, and detection of antibodies by serological and immunological methods.

CLS 5090. Special Laboratory Methods. (1-2 cr; A-F only. Prereq–#)
Assignment on an individual basis to one of a variety of special areas of experience in the clinical lab.

CLS 5100. Virology, Mycology, and Parasitology for Medical Technologists. (2 cr; A-F only. Prereq–Microbiology course with lab, biochem course)
Lab diagnosis of viral, fungal, and parasitic infections. Lecture.

CLS 5104. Principles of Diagnostic Microbiology: Lecture. (2 cr; A-F only. Prereq–One microbiology course with lab, one biochemistry course, #)
Current techniques used in lab diagnosis of infectious disease. Isolating/identifying bacteria and yeasts. Antimocrobial susceptibility testing. Lecture.

CLS 5105. Principles of Diagnostic Microbiology: Laboratory. (2 cr; A-F only. Prereq–One microbiology course with lab, one biochemistry course, #)
Current techniques used in lab diagnosis of infectious disease. Isolating/identifying bacteria/yeasts. Antimicrobial testing. Laboratory.

CLS 5120. Seminar: Clinical Laboratory Science. (1 cr [max 3 cr]; S-N only. Prereq–#)
Current literature. Presentation/discussion of research.

CLS 5121. Journal Presentations. (1 cr [max 2 cr]; S-N only. Prereq–1st yr CLS grad student)
Critical analysis, evaluation, discussion of current journal articles in student's specialty area.

CLS 5125. Practicum Teaching. (1-2 cr; A-F only. Prereq–#)
Supervised teaching experience, develop skills using instructional materials, tests, and measurements.

CLS 5127. Introduction to Management and Education I. (1 cr; A-F only. Prereq–#)

CLS 5129. Elements of Laboratory Administration. (2 cr; A-F only. Prereq–#)
Leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, product evaluation, lab safety, labor relations, government regulations.

CLS 5130. Practicum in Laboratory Administration. (2 cr; A-F only. Prereq–#)
Supervised experience and assignment of specific problems related to lab service and management in health care institutions.

CLS 5135. Advanced Clinical Microbiology. (3 cr. Prereq–#)
Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5140. Techniques for Teaching. (2 cr; A-F only. Prereq–#)
Developing objectives, classroom activities, and evaluation criteria for medical technology education.

CLS 5155. Advanced Clinical Hematology. (3 cr. Prereq–#)
Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5165. Advanced Clinical Immunohematology. (3 cr. Prereq–#)
Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5175. Advanced Clinical Chemistry. (3 cr. Prereq–#)
Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5251. Hematology I: Basic Techniques. (3 cr; A-F only. Prereq–#)
Theory and application of basic principles and techniques in clinical hematology and hemostasis. Lecture and lab.

CLS 5252. Hematology II: Morphology and Correlation. (2 cr; A-F only. Prereq–5251 or MedT 4251)
Fundamentals of blood and bone marrow examination emphasizing microscopic identification of immature and abnormal cells. Clinical correlation of lab findings in hematology and hemostasis. Lecture and lab.

CLS 5253. Hemostasis. (1 cr; A-F only. Prereq–5251 or MedT 4251)
Theory and application of specific concepts and techniques in hemostasis and coagulation. Lecture and lab.

CLS 5310. Clinical Chemistry I: Lecture. (2 cr; A-F only. Prereq–Organic chem course with lab; biochem course, #)
Principles and theory of clinical chemistry for assessing renal and metabolic disease/dysfunction, electrolyte balance, and acid-base balance. Principles and processes for quality management in the clinical lab.

CLS 5311. Clinical Chemistry I: Laboratory Applications. (2 cr; A-F only. Prereq–One organic chemistry course with laboratory; one biochemistry course, #)
Application of clinical chemistry principles and laboratory techniques in the analysis of urine, plasma, and body fluids. Emphasis on laboratory tests to evaluate renal function, electrolytes, and acid-base balance. Introduction to principles and processes for managing test quality. Laboratory.

CLS 5320. Clinical Chemistry II: Lecture. (2 cr; A-F only. Prereq–Organic chem course with lab, biochem course, 5310 or MedT 4310, #)
Principles and theory of clinical chemistry for assessing metabolic disease/dysfunction involving hormones, enzymes, lipids/lipoproteins, cardiac function, liver, and digestive tracts. Emphasis on measurement methods and physiological significance.

CLS 5321. Clinical Chemistry II: Laboratory Applications. (2 cr; A-F only. Prereq–Organic chem course with lab, biochem course, 5310 or MedT 4310, #)
Application of clinical chemistry principles and lab techniques in analyzing serum, plasma, and urine. Focus on tests to evaluate selected disorders. Developing lab and instrumentation use skills with emphasis on quality control and technique.

CLS 5768. Advanced Hematology. (5-10 cr [max 30 cr]. Prereq–#)
Practical experience collecting bone marrow from patients. Diagnosing hematological diseases by evaluating and interpreting cells from clinical specimens of bone marrow, peripheral blood, and, if applicable, lymph nodes.

CLS 5864. Research Seminar. (1 cr [max 10 cr]; S-N only. Prereq–#)
Departmental research seminar series.

CLS 5865. Departmental Seminar. (1 cr [max 10 cr]; S-N only. Prereq–#)
Departmental clinical lab research seminar series.

College of Liberal Arts (CLA)

College of Liberal Arts

CLA 1050. Faculty Mentor Freshman Seminar. (2 cr; A-F only. Prereq–Δ, Faculty Mentor Program)
Discussions led by faculty mentors on liberal education, nature of University life, major exploration, study skills appropriate to various disciplines.

CLA 1301. SEAM First Year Seminar. (2 cr; A-F only. Prereq–SEAM)
Exploration of issues related to students' academic/career interests. Multiculturalism, other skills. Small-group discussions.

CLA 1302. SEAM First-Year Colloquium. (2 cr; A-F only. Prereq–SEAM)
Introduction to resources that enhance academic/professional interests. Focus on multiculturalism. Small group discussions led by professional staff, guest speakers.

CLA 1901, 1902, 1903, 1904, 1905, 1906W, 1907W, 1909W, 1910W. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr or no more than 36 cr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

Veterinary Medicine (CVM)

College of Veterinary Medicine

CVM 1000. Introduction to Veterinary Medicine. (1 cr; S-N only)
History of veterinary profession, careers within the profession, employment trends. Information about admission to DVM. Veterinary technology programs.

CVM 3502. Animal Health and Disease. (3 cr; A-F only. Prereq–Biol 1009)
Common diseases that affect farm animals (especially dairy cattle, swine). Host-agent-environment interactions that cause disease (microbiology, immunology, environmental factors). Incorporating preventive management practices in animal production systems, monitoring health/productivity, recognizing disease. Treatment considerations. Major exotic/zoonotic diseases. In-house labs or field trips.

Communication Disorders (CDis)

Department of Communication Disorders

College of Liberal Arts

CDis 1301W. The Physics and Biology of Spoken Language. (4 cr)
Physics and biology of spoken language, from the talker's production of sounds and words, to the transmission of sound, to the listener's perception of what was said. Computer analysis and synthesis of speech.

CDis 1401. Introduction to Communication Disorders. (4 cr. §3401)
Disorders of spoken communication, their functional effect on quality of life for individuals with communication disorders. Intervention techniques for specific disorders of speech, language/hearing in context of social, cultural, linguistic diversity.

CDis 1902. Freshman Seminar. (3 cr; A-F only)
Topics vary. See *Class Schedule*.

CDis 3301. Introduction to Acoustics. (3 cr)
Elements of acoustics necessary to understand quantitative aspects of speech and hearing science, speech-language pathology, and audiology. Nature of sound, sound transmission, simple harmonic motion, sound intensity and pressure, complex waves, resonance and filtering, and distortion.

CDis 3302. Anatomy and Physiology of the Speech and Hearing Mechanisms. (3 cr)
Gross anatomy and basic physiology of the nervous, auditory, respiratory, laryngeal, velopharyngeal, and orofacial systems with emphasis on normal communication processes.

CDis 3303. Language Acquisition and Science. (4 cr)
Survey of typical language development and major theoretical perspectives about development. Applications of current theory to analysis of children's language.

CDis 3304. Phonetics. (3 cr)
Phonetic analysis, transcription of speech; articulatory correlates of speech sounds. Extensive practice transcribing. Emphasis on narrow transcription of normal adult English, and special populations in Speech-Language Pathology. Non-English IPA sounds needed for special populations.

CDis 3305W. Speech Science. (4 cr. Prereq–3301, 3302, 3304 or #)
A survey of theories, methods, and research in the discipline of speech science, including speech acoustics, speech perception, and speech production.

CDis 3306. Hearing Science. (3 cr. Prereq–3301, 3302 or #)
Theories, methods, and research in psychological and physiological acoustics with emphasis on the relation between physiological measures and perception. Topics include cochlear mechanics, auditory nerve firing patterns, scaling, and object perception.

CDis 3401. Introduction to Communication Disorders. (4 cr. §1401)
Disorders of spoken communication, their functional effect on quality of life for individuals with communication disorders. Intervention techniques for specific disorders of speech/language/hearing in context of social, cultural, linguistic diversity.

CDis 3402W. Major Project in Speech and Hearing Science. (3 cr; S-N only. Prereq–Jr or sr CDis major)
Seminar for completion of the undergraduate major project paper by students in their junior or senior years.

CDis 3403W. Communication Disorders and Cultural Diversity. (3 cr)
Examination of the influence of culture on communication disorders and the role of the speech-language pathologist in serving increasingly diverse populations in public schools.

CDis 4301. Neural Bases of Communication. (3 cr)
Basic neuroanatomy and neurophysiology, especially as they relate to normal speech, language, and hearing processes.

CDis 4501. Speech Disorders. (3 cr. Prereq–3302 or #)
Current concepts of the nature and treatment of disorders related to voice, resonance fluency, and swallowing. Disorders associated with dysarthria, cleft palate, laryngectomy, stuttering, voice quality, and dysphagia.

CDis 4601. Language Disorders. (3 cr. Prereq–3303 or #)
Acquaints students with language delay and disorders and offers an overview of assessment and intervention strategies that are commonly used by speech/language pathologists.

CDis 4801. Hearing Measurement and Disorders. (4 cr. Prereq–[3301, 3302] or #)
Introduction to theory, administration, and interpretation of behavioral/physiological hearing tests for all age groups. Immittance, pure tone, speech, otoacoustic emissions, evoked potential measures. Emphasizes hearing-screening protocols.

CDis 4802. Rehabilitative Audiology. (3 cr. Prereq–3305, 4801 or #)
Survey of sensory aids and methods used in rehabilitation across the life span after the diagnosis of hearing loss. Discussion of degree of hearing loss, developmental level, communication modalities, client/family choice, disability, and cultural considerations.

CDis 4803. Hearing Loss in Children: Rehabilitation. (3 cr. Prereq–1301 or #)
Oral language, listening, and speech production skills in infants and children with hearing losses. The normal developmental processes of speech perception and production, specific methodologies of auditory and speech production training, oral language intervention, and discussion of existing curricula.

CDis 5401. Counseling and Professional Issues. (4 cr. Prereq–4501 or 4601 or 4801 or #)
Basic counseling principles and current professional issues in communication disorders. Application of counseling theory to clinical practice. Analysis of regulation, practice, and future direction of communication disorders.

CDis 5501. Fluency Disorders. (3 cr. Prereq–4501 or #)
Description, nature, and treatment of fluency disorders in children and adults. Involvement in therapeutic and research activities.

CDis 5502. Voice and Resonance Disorders. (3 cr. Prereq–3305, 4301, 4501 or #)
Normal and disordered aspects of voice and resonance. Organic and functional voice disorders, laryngectomy, and cleft palate. Basic information regarding the nature and clinical management of these disorders.

CDis 5503. Motor Speech Disorders. (3 cr. Prereq–3305, 4301, 4501 or #)
Dysarthria, speech-production disorders resulting from neurologic disorders or lesions, and apraxia of speech, a disorder of the volitional control of speech. Nature and management of motor speech disorders in adults and children.

CDis 5504. Dysphagia. (3 cr. Prereq–3305, 4301, 4501, or #)
Normal and disordered aspects of swallowing. The nature, etiologies, evaluation, and management of swallowing disorders will be covered.

CDis 5602. Phonological Disorders. (3 cr. Prereq–3304, 4601 or #)
Theory and research related to the nature, assessment, and treatment of phonological disorders in children.

CDis 5603. Child Language Disorders: Assessment and Intervention. (4 cr. Prereq–[3303, grad student] or #)
Language assessment, teaching procedures used with children/adolescents. Procedures apply to children who face language disabilities such as developmental delays, autism, learning disabilities.

CDis 5604. Language Assessment and Intervention: School Age Children. (3 cr. Prereq–4601 or #)
Strategies, models and service-delivery options in assessment and intervention for school-age children with language impairments. Emphasis on practical applications for speech-language pathologists.

CDis 5605. Language and Cognitive Disorders in Adults. (3 cr. Prereq–3302, 4301, 4601 or #)
Neurogenic communicative and cognitive disorders in adults, including aphasia, right-hemisphere syndrome, traumatic brain injury, and dementia. Consideration of neurologic substrates, assessment and diagnosis, and clinical intervention.

CDis 5606. Introduction to Augmentative and Alternative Communication. (3 cr. Prereq–4501, 4601 or #)
Description of the range of augmentative and alternative communication applications for persons with developmental and acquired disabilities.

CDis 5607. Electronic Communication Aids. (3 cr. Prereq–5606 or #)
Operational procedures for dedicated augmentative communication aids and related software applications. Design and implement assessment and intervention strategies relevant to dynamic and fixed display devices. Troubleshoot common technical difficulties encountered by individuals using electronic communication aids.

CDis 5801. Audiologic Assessment I. (3 cr. Prereq–4801 or #)
Basic audiometric battery including pure tones, speech, masking, and immittance in adults; industrial audiology and otoacoustic emissions.

CDis 5802. Hearing Aids I. (3 cr. Prereq–3305, 4801 or #)
Survey of modern hearing aids including history of development, electroacoustic functions, clinic and laboratory measurement techniques, sound field acoustics, techniques for selection.

CDis 5803. Hearing Loss in Children: Diagnosis. (3 cr. Prereq–4801 or #)
Behavioral, physiological approaches to assessment and identification, development of the auditory mechanism, etiologies of hearing losses in infants, children, selection of sensory aids, principles of case management with children and families.

CDis 5810. Laboratory Module in Audiology. (1-2 cr [max 5 cr]. Prereq–4801 or #)
Intensive study of clinical methods in audiology. Supplements didactic courses in audiology curriculum. Laboratory study, individually or in small groups.

CDis 5900. Topics: Communication Disorders. (1-3 cr)
Topics listed in communication disorders office.

CDis 5993. Directed Study. (1-12 cr [max 18 cr]. Prereq–#)
Directed readings and preparation of reports on selected topics.

Communication Studies (Comm)

Department of Communication Studies

College of Liberal Arts

Comm 1101. Introduction to Public Speaking. (3 cr)
Oral communication processes and elements. Criticism of and response to oral discourse. Individual speaking.

Comm 1101H. Honors: Introduction to Public Speaking. (3 cr. §1101. Prereq–Honors)
Oral communication processes/elements. Criticism of, response to oral discourse. Individual speaking.

Comm 1102. Introduction to Communication. (3 cr)
Verbal and nonverbal communication: public address, interpersonal, organizational, intercultural, and electronic. Ways in which new communication technologies influence and are influenced by existing forms of communication.

Comm 1102H. Honors: Introduction to Communication. (3 cr. §1102. Prereq–Honors)
Verbal/nonverbal communication: public address, interpersonal, organizational, intercultural, electronic. Ways in which new communication technologies influence/are influenced by existing forms of communication.

Comm 1313V. Honors: Analysis of Argument. (3 cr. §1313W. Prereq–Honors)
Strategies for analyzing, evaluating, generating arguments. Problems in listening/responding to argument.

Comm 1313W. Analysis of Argument. (3 cr)
Strategies for analyzing, evaluating, generating arguments. Problems in listening/responding to argument.

Comm 1902. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

Comm 1905. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

Comm 1907W–1909. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

Comm 3110. Topics in Speech-Communication. (3 cr [max 6 cr]. Prereq–[3211 or 3401 or 3601] [whichever is relevant to topic])
Cases illustrating speech-communication theory, underlying issues.

Comm 3131. Leadership Theory and Practice. (3 cr [max 6 cr]; S-N only. Prereq–Student hired for leadership position in New Student Programs, #)
Preparation for New Student Program leadership position. Attitudes/skills with leadership and student life issues. Building authentic community.

Comm 3190H. Honors: Research Seminar in Communication. (3 cr [max 6 cr]; A-F only. Prereq–Honors candidate in comm, #, Δ)
Conduct original research in rhetoric, communication theory, or media for honors thesis. Theory, methods, research writing.

Comm 3201. Introduction to Electronic Media Production. (3 cr; A-F only. Prereq–1101 or #)
Production and criticism of messages for the electronic media. Theory and practice in planning, scripting, production, and criticism in various electronic media. Student productions in laboratory.

Comm 3211. Introduction to U.S. Electronic Media. (3 cr [max 3 cr])
Historical development and current issues in electronic media technologies and programming. Effects of governmental, industrial, and public organizations on message content. Problem areas of electronic media.

Comm 3401. Introduction to Communication Theory. (3 cr. Prereq–1102)
Social scientific theory in communication. Communication history; logic of scientific theories and communication types of theories in interpersonal, small group, organizational, intercultural, and electronically mediated communication.

Comm 3402. Introduction to Interpersonal Communication. (3 cr)
Nature and function of communication between individuals in formal and informal relationships. Communicative interactions from theoretical and practical viewpoints.

Comm 3404. Language Borderlands. (3 cr)
Effect of multilingualism on self identity and sense of community. Subjective and social dimensions of being multilingual. Experience of language loss.

Comm 3405. Language and Gender. (3 cr. §WoSt 3305. Prereq–One women's studies course)
Gender/communication. Interdisciplinary theory. Role of communication in creating, maintaining, reinforcing, and changing gender relations in society.

Comm 3406. Language and Sexual Diversity. (3 cr)
Language use in lesbian, gay, bi-sexual, and transgender communities. Ways in which sexual diversity affects language use.

Comm 3411. Introduction to Small Group Communication. (3 cr)
Cooperative thinking in task-oriented groups. Planning, preparing for, and participating in small groups in private and public contexts.

Comm 3422. Interviewing and Communication. (3 cr; A-F only. Prereq–1101 or #)
Application of communication concepts in information interview process. Practical experience in planning, conducting, and evaluating informational, journalistic/elite, helping, persuasive, appraisal, and employment interviews. Class training and field experience.

Comm 3431. Persuasion Theories. (3 cr. Prereq–Soph recommended)
Sociological, psychological, and communication perspectives. Theoretical knowledge applied to persuasion problems.

Comm 3441. Introduction to Organizational Communication. (3 cr. Prereq–1101 or equiv)
Functions of communication in work groups, in organizational hierarchies, and between organizations.

Comm 3451W. Intercultural Communication: Theory and Practice. (3 cr. Prereq–Planning an intercultural experience)
Theories of and factors influencing intercultural communication. Development of effective intercultural communication skills.

Comm 3452W. Communication and the Intercultural Reentry. (3 cr. Prereq–Return from an intercultural experience)
Intercultural experience explored through stories and story telling, participant observation, and social scientific theory. Constructs include identity, learning styles, cultural adaptation, values, ethics.

Comm 3601. Introduction to Rhetorical Theory. (3 cr. Prereq–1101)
Theoretical systems intended to explain or direct the creation of public discourse. Traditional rhetoric to contemporary perspectives. Using theory to explain the practice of public discourse.

Comm 3605W. Persuasive Speaking and Speech Writing. (3 cr [max 3 cr]. Prereq–Soph)
Performance and composition with critical inquiry into rhetoric theories. Develops writing, thinking, and speaking skills.

Comm 3615. Argumentation. (3 cr. Prereq–Soph)
Argument(s) in relation to logic, dialectics, and rhetorical performance. Structured reasoning, informal conversation, familial arguments, debates in technical professions, communication ethics, and public/social argumentation.

Comm 3625. Communication Ethics. (3 cr; A-F only. Prereq–1102 or #)
Applying concepts and theories from philosophy and social science to ethical issues in interpersonal, group, organizational, intercultural, and media communication.

Comm 3631W. Freedom of Speech. (3 cr)
Communication theories and principles that underlie the concept of freedom of speech in the United States. A variety of contexts and practices are examined in order to understand how communicative interaction should be described and, when necessary, appropriately regulated.

Comm 3970. Directed Study. (1-3 cr [max 6 cr]. Prereq–One Comm course, #, ❑, Δ, [no program cr for Comm majors])
Guided individual reading or study.

Comm 3980. Directed Instruction. (3 cr [max 6 cr]; S-N only. Prereq–#, Δ, [no program cr for Comm majors])
Supervised planning and teaching of undergraduate courses.

Comm 3990. Research Practicum. (1-3 cr [max 6 cr])
How communication research is designed, implemented, and published. Focus is on working with senior faculty on their current research projects.

Comm 3995. Major Project. (1 cr; S-N only. Prereq–Comm major, #)
Individualized instruction leading to completion of senior project.

Comm 4231. Comparing Electronic Media Systems. (3 cr. Prereq–3211 or #)
Historical, political, and sociological aspects of electronic media systems throughout the world, including United States, Canada, Great Britain, France, Germany, and Russia. Regulation and impact on political, social, and economic development.

Comm 4235. Electronic Media and Ethnic Minorities—A World View. (3 cr)
Representation and involvement of various ethnic groups (e.g., African-Americans, Native Americans in United States and Canada, Maori, Turks in Europe) in radio, TV, cable, Internet. Roles of government, industry, public organizations, and minority groups in regulating, managing, and financing ethnic media activities.

Comm 4291. New Telecommunication Media. (3 cr; A-F only. Prereq–3211 or #)
Development and current status of new telecommunication media such as cable TV, satellites, DBS, MDS, and video disk/cassettes. Technology, historical development, regulation, and programming of these media and their influence on individuals, organizations, and society.

Comm 4407. Communication and Conflict. (3 cr; A-F only. Prereq–3401 or #)
Aspects of conflict common across types of relationships. Theories as alternative lenses to illuminate aspects of conflict. Communication strategies to manage or resolve conflict.

Comm 4452W. Intercultural Interaction: Theory and Application. (3 cr. Prereq–#)
Small group interaction across cultures for both international and U.S. students. Discussion, simulations, readings.

Comm 4471. Communication in Marriage and Family. (3 cr. Prereq–3401 or 3402 or #)
Contemporary theories of marriage/family communication using life-cycle approach. Role/function of communication in changing relational contexts. Ways of improving marriage/family relationships.

Comm 4616. African American Civil Rights Rhetoric. (3 cr. Prereq–Jr)
Uses the struggle of African Americans to explore and analyze philosophical concepts, political issues, moral complexities, and discursive characteristics of civil rights rhetoric.

Comm 4621W. Rhetoric of Feminism. (3 cr. Prereq–4615 or #)
History and criticism of the rhetoric of feminism from 19th century to the present.

Comm 5110. Special Topics in Communication Theory. (3 cr [max 6 cr])
Advanced theoretical problems. See department office for current offering.

Comm 5210. Contemporary Problems in U.S. Electronic Media. (3 cr [max 3 cr]. Prereq–3211)
Problems affecting U.S. commercial and educational electronic media. Audiences; race/gender issues; regulation.

Comm 5220. Television Genres. (3 cr [max 3 cr])
Nature, historical development, and influence on society of specific genres of television programming: drama, situation comedy, mystery, soap opera. Program genre change over time and how society, government regulation, and economics of production influence that historical process.

Comm 5233W. Electronic Media and National Development. (3 cr)
Use of electronic media to change social, political, economic, and cultural life. Use by developing nations to improve agricultural practices, hygienic standards, literacy, and awareness of civic responsibility.

Comm 5261. Political Economy of Media Culture. (3 cr. Prereq–3211 or #)
Organizational practices of media communicators. Media content as link between communicators and audiences. How viewers use/process media content.

Comm 5401. Advanced Theories of Communication. (3 cr. Prereq–3401 or grad)
Survey of major theoretical approaches to communication including, positivism, constructivism, and systems.

Comm 5402. Advanced Interpersonal Communication. (3 cr. Prereq–1102, 3402 or 3411 or 3431 or 3441 or 3451)
Social scientific approaches to interpersonal communication; theory and research findings.

Comm 5404. Language, Culture, and Identity. (3 cr. Prereq–3401 or #)
How language/communication transmit cultural knowledge, attitudes, and beliefs. Connections among language, thought, and culture. Social/ethnic perspectives on study of language/communication.

Comm 5406. Communication and Gender. (3 cr. Prereq–One women's studies course or #)
How gender affects verbal communication. Development of analytical skills through readings, exercises, research that raise awareness of the power of language and the influence of gender prescriptions. Comparisons across languages where possible.

Comm 5408. Social Cognition. (3 cr)
Role of cognitive processing in communication studies. Models include perception, attention, memory and their use in communication. Evaluation of social cognition theory and research.

Comm 5411. Small Group Communication Research. (3 cr; A-F only. Prereq–3411 or #)
Survey of small group communication research; theory and practice. Group decision-making and leadership.

Comm 5421. Quantitative Methods in Communication Research. (3 cr; A-F only. Prereq–3401 or #)
Social scientific methods used in studying human communication. Optional data processing laboratory for additional credit.

Comm 5431. The Process of Persuasion. (3 cr. Prereq–3431)
Communication campaigns (e.g., advertising, political) illustrating persuasive processes and theories. Research paper required.

Comm 5441. Communication in Human Organizations. (3 cr. Prereq–9 cr social science, 3441 or #)
Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.

Comm 5451W. Intercultural Communication Processes. (3 cr)
Theory and research on cultural differences in values, norms, behaviors, and perceptions that affect communication across cultures internationally and domestically.

Comm 5461. Conversation Analysis. (3 cr. Prereq–Ling 3001 or Ling 5001)
Discourse processes in dyadic and multiparty conversation. Application of concepts through analysis of conversations.

Comm 5462. Field Research in Spoken Language. (3 cr. Prereq–5461, Ling 3001 or Ling 5001)
Transcribing and analyzing verbal communication and movement related to it. Applying concepts to recorded conversations.

Comm 5611. Survey of Rhetorical Theory. (3 cr. Prereq–1101)
Survey of rhetorical theory from ancient to contemporary period; application of theory to public discourse.

Comm 5615W. Introduction to Rhetorical Criticism. (3 cr. Prereq–1101, 3601 recommended)
Analysis of public discourse using various theoretical perspectives.

Comm 5617. History and Criticism of U.S. Public Discourse: 1630-1865. (3 cr. Prereq–Jr)
How discourse has been used to establish or maintain power. Speeches and public debates used to examine American public address from 17th century (e.g., Puritan sermons) to the Civil War.

Comm 5618. History and Criticism of U.S. Public Discourse: 1865-1950. (3 cr. Prereq–Jr)
How discourse has been used to establish or maintain power. Speeches and public debates used to examine U.S. public address from the mid 19th century to 1950.

Comm 5970. Directed Study. (1-3 cr [max 6 cr]; S-N only. Prereq–Nine 3xxx-5xxx Spch cr, #, Δ, ❑)
Guided individual reading or study.

Comm 5994. Communication Research Practicum. (1-3 cr [max 9 cr]; S-N only. Prereq–#)
Students participate in research group.

Comparative Literature (CLit)

Department of Cultural Studies and Comparative Literature

College of Liberal Arts

CLit 5331. Discourse of the Novel. (3 cr. §CSCL 5331)
Comparative study of the novel (eighteenth century to present): its relation to ordinary language practices, emergent reading publics, technologies of cultural dissemination, problems of subjectivity; its role in articulating international cultural relations.

CLit 5555. Introduction to Semiotics. (3 cr. §CSCL 5555)
Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Applying semiotics to various signifying practices (e.g., literature, cinema, daily life).

CLit 5751. Basic Concepts of Cinema. (4 cr. §CSCL 5751, §CSDS 5751)
Cinema as object of theoretical/historical analysis. Emphasizes concepts that have transformed scope/aim of film analysis since 1960s. Readings of filmic/theoretical texts.

CLit 5910. Topics in Comparative Literature. (3 cr [max 24 cr])
Topics specified in *Class Schedule.*

CLit 5992. Directed Reading in Comparative Literature. (1-3 cr [max 9 cr]. Prereq–#)
Guided individual reading and study.

Comparative Studies in Discourse and Society (CSDS)

Department of Cultural Studies and Comparative Literature

College of Liberal Arts

CSDS 5301. Society, Ideology, and the Production of Art. (3 cr. §CSCL 5301)
Recent critical theories of relation of arts to social/ideological forces. Selected artifices from Western culture (e.g., Renaissance to 20th century; high, popular, mass culture). Music, visual art, literature.

CSDS 5302. Aesthetics and the Valuation of Art. (3 cr. §CSCL 5302)
Society, ideology, aesthetic value in light of recent critical theories of visual art, music, literature. Mediations of place, social class, gender, ideology on aesthetic judgment in post-renaissance Western culture.

CSDS 5751. Basic Concepts of Cinema. (4 cr. §CSCL 5751, §CLit 5751)
Cinema as object of theoretical/historical analysis. Emphasizes concepts that have transformed scope/aim of film analysis since 1960s. Readings of filmic/theoretical texts.

CSDS 5910. Topics in Comparative Studies in Discourse and Society. (3 cr [max 24 cr])
Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics specified in *Class Schedule.*

CSDS 5993. Directed Study. (1-3 cr [max 9 cr]. Prereq–#)
Guided individual reading and study.

Computer Science (CSci)

Department of Computer Science

Institute of Technology

CSci 1103. Introduction to Computer Programming in Java. (4 cr)
Programming and problem solving fundamentals. Significant portions of Java programming language. Students design/write Java programs relating to various subjects. Substantial programming projects, integral weekly lab.

CSci 1107. Introduction to FORTRAN Programming for Scientists and Engineers. (3 cr. Prereq–Math 1271 or Math 1371 or #)
Algorithm development and principles of computer programming using FORTRAN. Emphasizes numerical methods for science and engineering applications.

CSci 1113. Introduction to C/C++ Programming for Scientists and Engineers. (4 cr. Prereq–Math 1271 or Math 1371)
Programming for scientists/engineers. C/C++ programming constructs, object-oriented programming, software development, fundamental numerical techniques. Exercises/examples from various scientific fields.

CSci 1121. Introduction to the Internet 1. (4 cr; A-F only)
Concepts of the internet, analog vs. digital communication, networking, packet switching, software protocols. E-mail, search engines, file transfer (ftp), remote login (Telnet). Creating Web pages using HTML and Cascading Style Sheets. Advanced programming concepts such as Java, Perl, and CGI.

CSci 1901. Structure of Computer Programming I. (4 cr. Prereq–¶Math 1271 or equiv or #)
Principles of programming. Different programming paradigms (message-passing, data-driven, event-driven). Students develop algorithms/data types using language such as Scheme and techniques such as abstraction, procedures, recursion, iteration.

CSci 1902. Structure of Computer Programming II. (4 cr. Prereq–1901 or #)
Object-oriented programming using language such as C++ or Java. Builds on 1901, presenting additional data structures/algorithms. Object-oriented approach to implement data structures/operations as abstract data types.

CSci 2011. Discrete Structures of Computer Science. (4 cr. Prereq–Math 1272 or Math 1372 or #)
Foundations of discrete mathematics. Sets, sequences, functions, big-O, propositional and predicate logic, proof methods, counting methods, recursion and recurrences, relations, trees/graph fundamentals.

CSci 2021. Machine Architecture and Organization. (4 cr. Prereq–1902 or #)
Introduction to hardware and programming in assembler language: transistors, integrated circuits, logic gates, Boolean algebra, computing devices, data representation, number systems, computer organization.

CSci 2031. Introduction to Numerical Computing. (4 cr. §CSci 5301. Prereq–Math 2243 or #)
Introduction to numerical computing for CSci, mathematics, and science/engineering students. Uses Mathematica or Matlab to cover numerical error, root finding, systems of equations, interpolation, numerical differentiation and integration, least squares, and differential equations.

CSci 2101W. Social, Legal, and Ethical Issues in Computing. (3 cr. §2109. Prereq–At least soph or #)
Impact of computers on society. Computer science perspective of ethical, legal, social, philosophical, political, and economic aspects of computing.

CSci 2109. Social, Legal, and Ethical Issues in Computing (non-W). (3 cr. §2101. Prereq–At least soph or #)
Impact of computers on society. Computer science perspective of ethical, legal, social, philosophical, political, and economic aspects of computing.

CSci 2121. Introduction to the Internet 2. (4 cr; A-F only. Prereq–1121)
Programming for the Internet using HTML, JavaScript, and Perl. CGI, database programming with Perl. Database concepts such as relational vs. object oriented database technologies, querying data using SQL. Interfacing databases to the Web. E-commerce, emerging trends such as XML.

CSci 2980. Special Topics in Computer Science. (1-4 cr [max 1 cr]; A-F only. Prereq–#)
Special topics. Lectures, informal discussions.

CSci 3970. Industrial Student Co-op Assignment. (2 cr [max 8 cr]; S-N only. Prereq–CSci, in coop program)
Industrial work assignment in a coop program involving advanced computer technology. Reviewed by a faculty member. Grade based on final written report covering the work assignment.

CSci 3980. Undergraduate Colloquium. (1 cr [max 2 cr]. Prereq–Upper div CSci; can be repeated for cr)
Current computing trends and hot topics; industrial and career related topics; research topics; research projects and undergraduate research opportunities; graduate school options.

CSci 4011. Formal Languages and Automata Theory. (4 cr. Prereq–1902 and 2011 or #; no cr for grads in CSci)
Logical and mathematical foundations of Computer Science. Theoretical models and their applications. Formal languages, models of computation, computability, undecidability, computational complexity. Emphasizes grammars, parsing, interpreters, and compilers.

CSci 4041. Algorithms and Data Structures. (4 cr. Prereq–1902 and 2011 or #; no cr for grads in CSci)
Rigorous analysis of algorithms and their implementation. Algorithm analysis, sorting algorithms, binary trees, heaps, priority queues, heapsort, balanced binary search trees, AVL trees, hash tables and hashing, graphs, graph traversal, single source shortest path, minimum cost spanning trees.

CSci 4061. Introduction to Operating Systems. (4 cr. Prereq–2021; no cr for grads in CSci)
Foundations of operating systems. History and evolution of operating systems, shells, tools, memory organization, file system overview, I/O, concurrent processes, and interprocess communication.

CSci 4081W. Introduction to Software Engineering. (4 cr. §5801, §4089. Prereq–[1902, 2011] or #; no cr for grads in CSci)
Basic theory/practice of software engineering. Software development, requirements/specifications, design, verification, and validation.

CSci 4089. Introduction to Software Engineering (non-W). (4 cr. §5801, §4081. Prereq–[1902, 2011] or #; no cr for grads in CSci)
Basic theory/practice of software engineering. Software development, requirements/specifications, design, verification, and validation.

CSci 4107. Introduction to Computer Graphics Programming. (3 cr. §5107. Prereq–4041 or #; cannot be taken for grad CSci cr)
Theory/practice of computer graphics programming using C/C++ and OpenGL. Practical concepts in computer graphics modeling, rendering, and animation. Emphasizes effective use of graphics toolkits.

CSci 4131. Internet Programming. (3 cr. §5131. Prereq–4061; 4211 recommended, cannot be taken for grad CSci cr)
Issues in internet programming. Internet history, architecture/protocols, network programming, Web architecture. Client-server architectures and protocols. Client-side programming, server-side programming, dynamic HTML, Java programming, object-oriented architecture/design, distributed object computing, Web applications.

CSci 4211. Introduction to Computer Networks. (3 cr. §5211. Prereq–4061 or #; basic knowledge of [computer architecture, operating systems] recommended, cannot be taken for grad CSci cr)
Concepts, principles, protocols, and applications of computer networks. Layered network architectures, data link protocols, local area networks, routing, transport, network programming interfaces, networked applications. Examples from Ethernet, Token Ring, TCP/IP, HTTP, WWW.

CSci 4707. Practice of Database Systems. (3 cr. §5707. Prereq–4041 or #; cannot be taken for grad CSci cr)
Concepts, conceptual data models with case studies, common data manipulation languages, logical data models, database design, facilities for database security/integrity, applications.

CSci 4921. History of Computing. (3 cr. §HSci 4321)
Developments in last 150 years; evolution of hardware and software; growth of computer and semiconductor industries and their relation to other businesses; changing relationships resulting from new data-gathering and analysis techniques; automation; social and ethical issues.

CSci 4970W. Advanced Project Laboratory. (3 cr [max 9 cr]. Prereq–Upper div CSci, 4061, #; cannot be taken for grad cr)
Formulate and solve open-ended project: design, implement, interface, document, test. Team work strongly encouraged. Arranged with CSci faculty.

CSci 5103. Operating Systems. (3 cr. Prereq–4061 or #)
Conceptual foundation of operating system designs and implementations. Relationships between operating system structures and machine architectures. UNIX implementation mechanisms as examples.

CSci 5106. Programming Languages. (3 cr. Prereq–4011 or #)
Design and implementation of high-level languages. Course has two parts: (1) language design principles, concepts, constructs; (2) language paradigms, applications. Note: course does not teach how to program in specific languages.

CSci 5107. Fundamentals of Computer Graphics 1. (3 cr. §4107. Prereq–[4041 or #], fluency in C/C++, mastery of basic concepts in linear algebra)
Fundamental algorithms in computer graphics. Emphasizes programming projects in C/C++. Scan conversion, hidden surface removal, geometrical transformations, projection, illumination/shading, parametric cubic curves, texture mapping, antialising, ray tracing. Developing graphics software, graphics research.

CSci 5108. Fundamentals of Computer Graphics II. (3 cr. Prereq–5107 or #)
Advanced topics in image synthesis, modeling, and rendering. Image processing, image warping, global illumination, non-photorealistic rendering, texture synthesis. Parametric cubic surfaces, subdivision surfaces, acceleration techniques, advanced texture mapping. Programming is in C/C++.

CSci 5115. User Interface Design, Implementation and Evaluation. (3 cr. Prereq–4041 or #)
Theory, design, programming, and evaluation of interactive application interfaces. Human capabilities and limitations, interface design and engineering, prototyping and interface construction, interface evaluation, and topics such as data visualization and World Wide Web. Course is built around a group project.

CSci 5116. GUI Toolkits and Their Implementation. (3 cr. Prereq–5115 or 5107 or #)
Structure and design of user interface toolkits and frameworks. Aspects of GUI toolkits (e.g., window system protocols, event processing, geometry management, resource management, data management, constraints). Course is built around implementation assignments and case studies of toolkits.

CSci 5131. Advanced Internet Programming. (3 cr. §4131. Prereq–5106 or 5211 or #; [4081 or 5801], 5707 recommended)
Issues in internet programming: Java programming, concurrent programming, workflow, distributed databases, security, collaborative computing, object-oriented architecture/design, network publishing, messaging architecture, distributed object computing, internets.

CSci 5161. Introduction to Compilers. (3 cr. Prereq–4011 or #)
Theories and mechanisms of programming language processing tools. General compiler organization: lexical scanner, syntax parser, symbol table, internal program representation, code generator. Relationship between design and implementation. Run-time memory management mechanism.

CSci 5201. Computer Architecture. (3 cr. §EE 5361. Prereq–2021 or #)
Introduction to computer architecture. Pipelining, memory hierarchy, and input/output systems. Performance metrics. Examination of each component of a complicated computer system.

CSci 5211. Data Communications and Computer Networks. (3 cr. §4211. Prereq–[4061 or #], basic knowledge of [computer architecture, operating systems, probability])
Fundamental concepts, principles, protocols, and applications of computer networks. Layered network architectures, data link protocols, local area networks, network layer/routing protocols, transport, congestion/flow control, emerging high-speed networks, network programming interfaces, networked applications. Case studies using Ethernet, Token Ring, FDDI, TCP/IP, ATM, Email, HTTP, and WWW.

CSci 5283. Computer-Aided Design I. (3 cr. Prereq–2021 or #)
CAD for digital systems. Emphasizes VLSI. Hardware description languages, synthesis, simulation, test generation.

CSci 5285. Computer-Aided Design of VLSI. (3 cr. Prereq–2021 or #)
CAD for digital systems. Emphasizes VLSI. Physical design: partitioning, placement/routing, electrical rule checks. Inherent complexity of algorithms. Analysis of best known algorithms.

CSci 5302. Analysis of Numerical Algorithms. (3 cr. Prereq–2031 or #)
Additional topics in numerical analysis: interpolation, approximation, extrapolation, numerical integration/differentiation, numerical solutions of ordinary differential equations.

CSci 5304. Computational Aspects of Matrix Theory. (3 cr. Prereq–5302 or #)
Perturbation theory for linear systems and eigenvalue problems. Direct and iterative solution of large linear systems. Decomposition methods. Computation of eigenvalues and eigenvectors. Singular value decomposition. LAPACK and other software packages. Methods for sparse and large structured matrices.

CSci 5321. Linear and Nonlinear Programming. (4 cr. Prereq–2031, some programming experience)
Standard form for linear programming (LP), simplex method and geometry of LP, revised simplex method, duality theory and sensitivity, approximation of data by LP, interior methods, affine scaling algorithms, unconstrained optimization.

CSci 5403. Computational Complexity. (3 cr. Prereq–4041 or #)
Computational models, complexity measures in each model, and related complexity classes.

CSci 5421. Advanced Algorithms and Data Structures. (3 cr. Prereq–4041 or #)
Fundamental paradigms of algorithm and data structure design. Divide-and-conquer, dynamic programming, greedy method, graph algorithms, amortization, priority queues and variants, search structures, disjoint-set structures. Theoretical underpinnings. Examples from various problem domains.

CSci 5451. Introduction to Parallel Computing: Architectures, Algorithms, and Programming. (3 cr. Prereq–4041 or #)
Parallel architectures design, embeddings, routing, examples of parallel computers, fundamental communication operations, performance metrics, parallel algorithms for sorting, matrix problems, graph problems, dynamic load balancing, types of parallelisms, parallel programming paradigms, message passing programming in MPI, data parallel programming in HPF, shared-address space programming in threads.

CSci 5481. Computational Techniques for Genomics. (3 cr. Prereq–4041 or #)
Techniques to analyze biological data generated by genome sequencing, proteomics, cell-wide measurements of gene expression changes. Algorithms for single/multiple sequence alignments/assembly. Search algorithms for sequence databases, phylogenetic tree construction algorithms. Algorithms for gene/promoter and protein structure prediction. Data mining for micro array expression analysis. Reverse engineering of regulatory networks.

CSci 5511. Artificial Intelligence I. (3 cr. Prereq–2011 or #)
Introduction to AI. Problem solving, search, inference techniques. Logic and theorem proving. Knowledge representation, rules, frames, semantic networks. Planning and scheduling. Lisp programming language.

CSci 5512W. Artificial Intelligence II. (3 cr. §5519. Prereq–5511 or #)
Advanced topics in AI for solving complex problems. Machine learning (symbolic/neural networks approaches), genetic algorithms, reasoning with uncertainty, utility theory and decision theoretic methods, natural language processing, perception robotics, introduction to Prolog programming language.

CSci 5519. Artificial Intelligence II (non-W). (3 cr. §5512. Prereq–5511 or #)
Advanced topics in AI for solving complex problems. Machine learning (symbolic and neural networks approaches), genetic algorithms, reasoning with uncertainty, utility theory and decision theoretic methods, natural language processing, perception robotics, introduction to Prolog programming language.

CSci 5521. Pattern Recognition. (3 cr. Prereq–5301, Stat 3021 or #)
Problems of pattern recognition, feature selection, measurement techniques. Classification methods: statistical decision theory, nonstatistical techniques. Automatic feature selection and data clustering. Syntactic pattern recognition. Mathematical pattern recognition and artificial intelligence. Applications in information retrieval and WWW data mining.

CSci 5551. Introduction to Intelligent Robotic Systems. (3 cr. Prereq–5511 or #)
Transformations, kinematics/inverse kinematics, dynamics, control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, and microrobotics.

CSci 5561. Computer Vision. (3 cr. Prereq–5511 or #)
Issues in perspective transformations, edge detection, image filtering, image segmentation, and feature tracking. Complex problems in shape recovery, stereo, active vision, autonomous navigation, shadows, and physics-based vision. Applications.

CSci 5707. Principles of Database Systems. (3 cr. §4707. Prereq–4041 or #)
Fundamental concepts, database architecture, alternative conceptual data models, foundations of data manipulation/analysis, logical data models, database designs, models of database security/integrity, current trends.

CSci 5708. Architecture and Implementation of Database Management Systems. (3 cr. Prereq–5707 or #)
Techniques in commercial and research-oriented database systems. Catalogs. Physical storage techniques. Query processing and optimization. Transaction management. Mechanisms for concurrency control, disaster recovery, distribution, security, integrity, extended data types, triggers, and rules.

CSci 5801. Software Engineering I. (3 cr. §4081. Prereq–2011, 1902 or #)
Advanced introduction to software engineering. Reviews and expands on 4081. Software life cycle; development models; software requirements analysis; software design, coding, and maintenance.

CSci 5802. Software Engineering II. (3 cr. Prereq–5801 or #)
Introduction to software testing, software maturity models, cost specification models, bug estimation, software reliability models, software complexity, quality control, and experience report. Student groups specify, design, implement, and test partial software systems. Application of general software development methods and principles from 5801.

CSci 5980. Special Topics in Computer Science. (1-3 cr [max 9 cr]. Prereq–#)
Lectures and informal discussions on current topics in computer science.

CSci 5991. Independent Study. (1-3 cr [max 9 cr]. Prereq–#; may be repeated for cr)
Independent study arranged with CS faculty member.

CSci 5994. Directed Research. (1-3 cr [max 9 cr]. Prereq–#; may be repeated for cr)
Directed research arranged with faculty member.

CSci 5996. Curricular Practical Training. (1 cr [max 3 cr]; S-N only. Prereq–[CSci or CompE] major, #)
Industrial work assignment involving advanced computer technology. Reviewed by faculty member. Grade based on final report covering work assignment.

Construction Management (CMgt)

College of Continuing Education

CMgt 3001. Introduction to Construction. (2 cr; A-F only)
Introduction to construction/processes that shape our environment. Construction types, their differences. Key participants, their vocabulary, delivery systems. Construction specialists, their roles. Elements of construction management. Lectures, field trips.

CMgt 4011. Construction Documents and Contracts. (2 cr. Prereq–Technical writing course [available at North Hennepin or Inver Hills Community College] or equiv or #)
Definition, interpretation, drawings, specifications, agreements, bidding forms, general conditions, bonds, contracts, subcontracts, related documents.

CMgt 4012. Risk Management, Bonds, and Insurance. (2 cr. Prereq–BAS student in construction management program or construction worker)
How to recognize/evaluate property, liability, health, and financial risks associated with construction projects. Risk control/financing. Insurance marketing, pricing, surety bond underwriting, financial analysis, claims administration.

CMgt 4013. Legal and Ethical Issues in Construction. (2 cr. Prereq–4011)
Role of construction management professional in society. Principles of conduct, goals for professional performance/behavior, review of mandatory requirements.

CMgt 4016. Construction Software. (2 cr; A-F only. Prereq–Beginning estimating course or currently employed in construction industry)
Current/future uses of technology by owners, general contractors, subcontractors, and facilities management personnel. Networking, databases, wireless communication, software selection, Web-based project management, online plan rooms. Hands-on, workshop environment.

CMgt 4018. E-Business in Construction. (2 cr; A-F only)
Selection/implementation of Web-based project management tools. Software such as Bidcom, E-builder, Bricsnet, Constructware, Frametech. Hands-on work with live building sites. Digital technologies in construction industry. Wire/wireless communication, online plan/bid rooms, mobile computing, video conferencing.

CMgt 4019. Autocad for Construction Managers. (2 cr)
Entry-level techniques of computer aided drafting (AutoCAD). Lecture/lab.

CMgt 4021. Construction Planning and Scheduling. (2 cr. Prereq–CMSV 2860 [available through NHCC]; primarily for BAS students in const mgmt program or those working in construction)
Project planning, scheduling, and control. Considering/understanding alternatives. Industry techniques (e.g., critical path method). Using commercial software on personal computers. Updating/analyzing project schedules.

CMgt 4022. Construction Estimating. (2 cr. Prereq–Construction Estimating and Critical Path Method [available at North Hennepin or Inver Hills Community College] or equiv or #; primarily for BCM students or those working in construction industry)
Variety of estimates. Techniques for performing quantity take-off, organizing bidding process, requesting/analyzing subcontractor proposals, unit pricing, using published resources, and preparing system-based estimates. Personal computer programs, spreadsheets, custom applications.

CMgt 4023. Value Engineering. (2 cr)
Primarily for students in the BCM program or those working in construction. Step-by-step approach of defining building system and materials function, allocating cost, defining alternative methods for performing, and evaluating to yield the best value.

Five phases of function analysis (value engineering): information, creative, evaluation, planning, and implementation.

CMgt 4024. Estimating and Value Engineering. (4 cr; A-F only. §4022, §4023. Prereq–CMSV 2860 [available at NHCC])
Purposes/uses of various kinds of estimates. Performing quantity take-off. Organizing bidding. Requesting/analyzing subcontractor proposals. Unit pricing. Using published resources. Preparing systems-based estimates. Personal computer programs, spreadsheets, custom applications. Defining building system, materials function. Allocating cost. Defining alternative methods for performing. Evaluating to yield best value.

CMgt 4025. Planning and Scheduling II. (2 cr; A-F only. Prereq–4021, upper div; see BAS Web site at www.cce.umn.edu/bas for more info)
Computer-based continuation of Planning and Scheduling I. Project planning, scheduling, and control. Critical path method. Updating/analyzing project schedules.

CMgt 4026. Construction Bidding and Estimating II. (2 cr; A-F only. Prereq–4022)
Computer-based construction estimating. Various kinds of estimates. Techniques for performing quantity take-off, organizing bidding process, requesting/analyzing subcontractor proposals, unit pricing, utilizing published resources, and preparing systems-based estimates. Personal computer programs, spreadsheets, custom applications. Linkages between estimates, budgets, cost control systems, and historical cost records.

CMgt 4030. Construction Safety and Loss Control. (2 cr; A-F only. Prereq–Upper div; primarily for BAS students in const mgmt program or those working in construction)
Introduction to construction safety, health, and loss control. Hazard recognition. Control procedures. Management systems for measuring/evaluating loss-control performances in construction industry.

CMgt 4040. Preparation of Specifications and Technical Writing for Construction Professionals. (3 cr. Prereq–4011; primarily for BAS students in const mgmt program or those working in construction)
Processes for research, analysis, and development of written construction documentation. Bidding and contract document relationships, project manual preparation, cost evaluation of building components, quality assurance methodology.

CMgt 4051. Construction Materials for Managers. (3 cr; A-F only)
Relationship between architectural form, human experience, and building technologies. Design principles/concepts of environmental technology (microclimate, thermal, aural, luminous design) and building technology (materials, methods of construction, structure). Impact of ecological issues, materials of construction, and structural systems on architectural design.

CMgt 4193. Directed Study. (1-4 cr [max 16 cr]. Prereq–BAS student in const mgmt program, Δ)
Topic arranged with BAS construction management academic adviser.

CMgt 4196. Construction Management Internship. (3-4 cr [max 12 cr]; S-N only. Prereq–BAS student in const mgmt program)
Professional experience internship requirement for BAS Construction Management program. Subject to faculty adviser approval.

CMgt 4550. Topics in Construction Management. (3 cr [max 9 cr]; A-F only)
Relationship between architectural form, human experience and building technologies. Design principles/concepts of environmental technology (microclimate, thermal, aural, luminous design) and building technology (materials, methods of construction, structure). Impact of ecological issues, materials of construction, and structural systems on architectural design.

CMgt 4901. Seminar: Communication and the Construction Process. (2 cr; A-F only)
Traces construction project from inception to completion. Interaction skills/techniques (written/oral) important to manager in delivering project through myriad of hoops, hurdles, and pitfalls.

Coptic (Copt)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Copt 5001. Elementary Coptic. (3 cr)
Introduction to Coptic grammar and vocabulary, chiefly in the Sahidic dialect.

Copt 5002. Elementary Coptic. (3 cr. Prereq–5001 or equiv)
Reading a variety of Coptic literature, such as Gnostic, martyrological, or monastic texts.

Cultural Studies and Comparative Literature (CSCL)

Department of Cultural Studies and Comparative Literature

College of Liberal Arts

CSCL 1001. Introduction to Cultural Studies: Rhetoric, Power, Desire. (4 cr)
Ways of reading texts, artistic forms, everyday practices that define ongoing conflicts over meaning, value, truth. Examples from visual arts, music, film, literature, myth, ritual, built environment.

CSCL 1101. Literature. (4 cr)
Introduction to literature across time, national boundaries. Basic genres, including poetry, novel, drama, historical/philosophical writing. Key questions: What is literature? What forms does it take? Why does literature matter?

CSCL 1201. Introduction to Cinema and Media Culture. (4 cr)
Critical analysis of films, particularly as they emerge within context of mass culture. Determining discursive specificity of cinema, network of institutions that expose this discourse to other media discourses. Rudiments of film theory. Brief engagement with production.

CSCL 1301W. Reading Culture: Theory and Practice. (4 cr)
How can we understand the concepts of culture, cultural conflict? Emphasizes practice in reading cultural theory. Texts such as film, literature, music, fashion, commercial art, built environment.

CSCL 1401W. Reading Literature: Theory and Practice. (4 cr)
How can we read/understand different ways that literature is meaningful? Emphasizes practice in reading a broad spectrum of world literature, literary theory.

CSCL 1501W. Reading History: Theory and Practice. (4 cr)
What is history? How can we understand its meanings/uses? Emphasizes practice in reading cultural texts from various historical perspectives.

CSCL 1903. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule.*

CSCL 1904. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule.*

CSCL 1905. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule.*

CSCL 1907W. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule.*

CSCL 1910W. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule.*

CSCL 1921. Introduction to Film Study. (4 cr)
Fundamentals of film analysis and an introduction to the major theories of the cinema, presented through detailed interpretations of representative films from the international history of the cinema.

CSCL 3000. Topics. (1-3 cr [max 2 cr])
Selected topics.

CSCL 3115. Cinema and Ideology. (4 cr)
The cinema as a social institution with emphasis on the complex relations it maintains with the ideological practices that define both the form and the content of its products. Specific films used to study how mass culture contributes to the process of shaping beliefs and identities of citizens.

CSCL 3172. Music as Discourse. (3 cr)
Close examination of widely varying musical forms and styles, "classical" and "popular," in relation to human subjectivity and configurations of culture, ideology, and power.

CSCL 3173W. The Rhetoric of Everyday Life. (3 cr)
How discourse reproduces consciousness and persuades us to accept that consciousness and the power supporting it. Literary language, advertising, electronic media; film, visual and musical arts, built environment and performance. Techniques for analyzing language, material culture, and performance.

CSCL 3174. Poetry as Cultural Critique. (3 cr)
Examines the status of "poetry" in several cultures of the Americas bringing together techniques of close reading and broad cultural inquiry.

CSCL 3175. Comedy: Text and Theory. (3 cr)
Comic forms (jokes, camp and ethnic humor, classic drama, TV sitcom, film) examined in relation to a broad spectrum of theory concerning the nature, mechanics, and uses of comedy in society.

CSCL 3176. Oppositional Cinemas. (4 cr)
The ways diverse national cinemas engage the international hegemony of Hollywood cinema. The cinematic struggle against cultural imperialism and the role of race, class, and gender in the domain of international cultural politics.

CSCL 3177. On Television. (4 cr. §SCMC 3177)
Key debates in the history, theory, and criticism of television. Focuses on critical/creative "readings" of television's past/present forms. TV's influence on film, music, and digital media.

CSCL 3179. Reading Literary Movements. (3 cr)
Literary movement that emerge when a group of writers puts forth a new definition of literature. Literary movements created by scholars after the fact. Focuses on one or two related movements (e.g., surrealism and dadaism).

CSCL 3321W. Theories of Culture. (3 cr)
Examination of three prevalent theoretical perspectives on culture—philosophical, anthropological, and aesthetic—as they converge in the work of writers who have contributed to our contemporary conception of cultural diversity.

CSCL 3331. Science and the Humanities. (3 cr)
The sciences and humanities battle over "truth" and "reality," while technology recasts the world of knowledge and work. The question of texts-as-truth also facilitates the ongoing religious attacks on science in this millennial moment.

CSCL 3361. Visions of Nature: The Natural World and Political Thought. (4 cr. §EEB 3361)
Theories about organization of nature, human nature, and their significance for development of ethics, religion, political/economic philosophy, civics, and environmentalism in Western/other civilizations. Lecture/discussion, film assignments.

CSCL 3366W. Nature, Landscape, and Ideology: 1600-1875. (3 cr)
Construction of "nature" as concept and environment in England and America. From Puritan "garden in the wilderness" to 18th-century "natural" landscape garden and 19th-century transcendentalism. Roles of agriculture, religion, philosophy, aesthetics, property, travel, exploration.

CSCL 3412W. Psychoanalysis and Literature Part I: The Essential Freud. (3 cr)
Theoretical writings of Sigmund Freud; basic concepts of psychoanalytic criticism; dream and interpretation; genre of the case study; Freud's ideas concerning the constitution of ethnicity, culture, identity, and gender; fantasy vs. reality; psychoanalysis of the author/character/culture.

CSCL 3413W. Psychoanalysis and Literature Part II: Post Freudian Criticism. (3 cr)
Impact of psychoanalytic discourses on literary studies and vice versa. Archetypal of Jung; structural of Lacan; post-structural of Derrida and Kristeva; feminist psychoanalysis of Mitchell; self/object of Kernberg and Kohut; the unconscious and society of Deleuze and Guattari.

CSCL 3421. Culture and the Production of Modern Identity I: 1600-1750. (3 cr)
History of cultural, perceptual and/or conceptual changes in Western societies, 1600 to 1750, concerning new and conflicting understandings of the human imagination, subjectivity, identity, and the body; addressed through philosophy, literature, visual arts, music, pedagogical and medical treatises, and manners.

CSCL 3456W. Sexuality and Culture. (3 cr)
Historical/critical study of forms of modern sexuality (heterosexuality, homosexuality, romance, erotic domination, lynching). How discourses constitute/regulate sexuality. Scientific/scholarly literature, religious documents, fiction, personal narratives, films, advertisements.

CSCL 3458W. The Body and the Politics of Representation. (3 cr)
Western representation of the human body, 1500 to present. Body's appearance as a site and sight for production of social and cultural difference (race, ethnicity, class, gender). Visual arts, literature, music, medical treatises, courtesy literature, erotica.

CSCL 3461. Monsters, Robots, Cyborgs. (3 cr)
Historical/critical reading of figures (e.g., uncanny double, monstrous aberration, technological hybrid) in mythology, literature, and film, from classical epic to sci-fi, cyberpunk, and Web.

CSCL 3472. Gay Men and Homophobia in American Culture. (3 cr)
The historical experience of gay men, the social construction of same-sex desire in American society since 1700, studied in a broad context of cultural history and discourse, including literature and the arts, journalism, science and medicine, religion, and law.

CSCL 3557. Close Reading. (3 cr)
History/theory of 'close reading' (i.e., the most intense encounter between reader and text) exemplified through critical texts. Students perform close readings of various texts.

CSCL 3631. Jewish Writers and Rebels in German, Austrian, and American Culture. (3 cr. §Ger 3631, §JwSt 3631. Prereq–No knowledge of German required; cr toward major or minor requires reading in German)
Literary/cultural modes of writing used by Jewish writers in Germany, Austria, and America to deal with problems of identity, anti-Semitism, and assimilation. Focus on 20th century. All readings (novels, poetry, stories) in English.

CSCL 3771. Basic Concepts of Literary Study. (3 cr)
Concepts used when carrying out work of reading/interpretation. How analysis works: aspects of distinction between text text/context, other concepts. How to understand/justify literary interpretation. Course does not engage in the reading of literature.

CSCL 3910. Topics in Cultural Studies and Comparative Literature. (3 cr)
Topics specified in *Class Schedule.*

CSCL 3944H. Honors Thesis. (3 cr. Prereq–Candidate for [magna or summa] honors in CSCL, consent of CSCL honors adviser)
Magna or summa honors thesis.

CSCL 3979. Issues in Cultural Pluralism. (3 cr)
The politics of the person: is it our destiny and nature to be either king or slave (Aristotle) or are we all created equal (Jefferson)? How do we judge ourselves and others, as individuals and as groups? How do we justify our judgments and move toward greater equality?

CSCL 3993. Directed Study. (1-3 cr [max 9 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

CSCL 4990W. Senior Seminar and Workshop. (3 cr [max 3 cr])
Student-defined, faculty-assisted collective research project devoted to the comparative, sociohistorical analysis of discursive practices and cultural artifacts. Limited to CSCL majors, this seminar/workshop offers an opportunity to apply skills and knowledge gained in previous classes, and to develop skills in research, critique, and presentation.

CSCL 5147. Teaching as Dialogue. (3 cr)
Teaching and the teacher are the subject. Entering into dialogue is the method. Issues with the politics of teaching, the means of entering into dialogue, questions of judgment, and the idea of self-teaching as the goal of teaching.

CSCL 5154W. Theoretical Constructions of Space. (3 cr)
Inquiry into theories of space drawn from various disciplines including anthropology, architecture, geography, history, landscape design, philosophy, planning, and sociology. Focus on sociopolitical interests that are served and sustained; emphasis on opportunities and implications for personal identity.

CSCL 5256. Suburbia. (3 cr)
Suburbia from origins in 18th-century England to the present. Historical changes and present challenges, especially in America. Ideology, mythology, planning, development, geography, transportation, the family. Specific sites and designs; representations in film, television, popular literature, and music.

CSCL 5301. Society, Ideology, and the Production of Art. (3 cr)
Recent critical theories on the relation of the arts to social and ideological forces; selected artifices from Western culture (Renaissance to 20th century; high, popular, and mass culture). Music, visual art, literature.

CSCL 5302. Aesthetics and the Valuation of Art. (3 cr)
Society, ideology, and aesthetic value considered in light of recent critical theories of visual art, music, and literature. Meditations of place, social class, gender and ideology on aesthetic judgment in post-Renaissance Western culture.

CSCL 5331. The Discourse of the Novel. (3 cr)
Comparative study of the novel, 18th century to present. Its relations to ordinary language practices, emergent reading publics, technologies of cultural dissemination, problems of subjectivity, and its role in articulating international cultural relations.

CSCL 5555. Introduction to Semiotics. (3 cr)
Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Application of semiotics to various signifying practices (literature, cinema, daily life).

CSCL 5711. Sociocriticism. (3 cr)
Sustained consideration of the modern tradition of sociological reflection on literature. Early and late Birmingham School, Frankfurt School, Bakhtin circle, and the various French initiatives associated with both Les Temps Modernes and Tel Quel.

CSCL 5751. Basic Concepts of Cinema. (4 cr)
Examination of the cinema as an object of theoretical and historical analysis. Emphasis on the concepts that have emerged to radically transform the scope and aim of film analysis since the 1960s. Readings of filmic and theoretical texts.

CSCL 5771. Basic Concepts of Literary Study. (3 cr)
Examination of literary discourse as an object of theoretical and historical analysis. Emphasis on the concepts that have emerged to radically transform the scope and aim of literary analysis since the 1960s. Readings of literary and theoretical texts.

CSCL 5835. Richard Wagner's "Der Ring des Nibelungen": Music, Myth, and Politics. (3 cr. Prereq–#)
Literary and musical analysis and historical context of the four works of Wagner's "Ring": Das Rheingold, Die Walküre, Siegfried, Götterdämmerung. Critical assessment of Wagner's achievement and influence.

CSCL 5910. Topics in Cultural Studies and Comparative Literature. (3 cr [max 24 cr])
Topics specified in *Class Schedule.*

CSCL 5993. Directed Study. (1-3 cr [max 9 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Curriculum and Instruction (CI)

Department of Curriculum and Instruction

College of Education and Human Development

CI 1001. Introduction to the Elementary School. (3 cr; A-F only)
Three modules focus on important aspects of contemporary urban elementary school teaching: the principal's role, the teacher's role, and the students. Central to each module are school-based visits, observations, and interviews.

CI 1901. Role of Education in a Democratic Republic. (3 cr; A-F only)
Relationship between democratic citizenship and education. Role of economics/ethics in defining character of education. Relationship between school/university programs and citizenship. Relevance of education in contemporary society.

CI 3001. Survey of Art Activities. (2 cr; A-F only)
Introduction to pictorial expression, design, and the function of art in the social environment.

CI 3401. Children's Literature. (2 cr; A-F only. Prereq–Jr or sr or #)
Introduction to children's literature as a field of study and as part of the elementary school curriculum. Attention to classic and contemporary books in all genres; research in children's reading interests and response to literature.

Note: Undergraduate students in CEHD may have access to some 5xxx courses. For more information, contact an Student & Professional Services or faculty adviser, or view a complete listing of CEHD courses at <www.coled.umn.edu/catalogs/catalog_intro.html>.

Dance (Dnce)

Department of Theatre Arts and Dance

College of Liberal Arts

Dnce 1001. Modern Dance Technique 1. (1 cr)
Expressive body movement: alignment, proprioceptiveness, body mechanics, weight, momentum, line, and intent.

Dnce 1002. Modern Dance Technique 2. (1 cr. Prereq–1001, Δ)
Continuation of 1001. Expressive body movement: alignment, proprioceptiveness, body mechanics, weight, momentum, line, and intent.

Dnce 1010. Modern Dance Technique 3. (2 cr [max 4 cr]. Prereq–1002, Δ)
Continuation of physical training. Theory of space, time, and energy. Correct placement, power from pelvic center, rotation/turnout, muscular tonality, articulation of joints, clarity of emotional intent, physical stretch, strength, and stamina.

Dnce 1020. Modern Dance Technique 4. (2 cr [max 4 cr]. Prereq–1010, Δ)
Continuation of 1010. Correct placement, power from pelvic center, rotation/turnout, muscular tonality, articulation of joints, clarity of emotional intent, physical stretch, strength, and stamina.

Dnce 1101. Ballet Technique 1. (1 cr)
Principles, basic technique, and vocabulary of ballet; barre, center, and allegro.

Dnce 1102. Ballet Technique 2. (1 cr. Prereq–1101, Δ)
Continuation of 1101. Principles, basic technique, and vocabulary of ballet; barre, center, and allegro.

Dnce 1110. Ballet Technique 3. (2 cr [max 4 cr]. Prereq–1102, Δ)
Continuation of ballet training. Correct placement, line and historical development; barre, center, and allegro.

Dnce 1120. Ballet Technique 4. (2 cr [max 4 cr]. Prereq–1110, Δ)
Continuation 1110. Ballet training; correct placement, line and historical development. Barre, center, and allegro.

Dnce 1201. Jazz Technique 1. (1 cr)
Jazz dance technique and its origins. Warm-up, center-floor work, and across-the-floor combinations.

Dnce 1202. Jazz Technique 2. (1 cr. Prereq–1201, Δ)
Continuation of 1201. Jazz dance technique and its origins. Warm-up, center-floor work, and across-the-floor combinations.

Dnce 1210. Jazz Technique 3. (1 cr [max 2 cr]. Prereq–1202, Δ)
Jazz technique; body isolations, placement, and musicality.

Dnce 1220. Jazz Technique 4. (1 cr [max 2 cr]. Prereq–1210, Δ)
Continuation of 1210. Jazz technique; body isolations, placement, and musicality.

Dnce 1301. Tap Technique 1. (1 cr)
Learning fundamental terms, basic rhythm structures, stock steps, and standard time steps.

Dnce 1302. Tap Technique 2. (1 cr. Prereq–1301 or #)
Fundamental terms, basic rhythms and syncopation, stock steps, and standard time steps; clarity of sound and rhythm.

Dnce 1311. International Folk Dance 1. (1 cr)
Basic folk steps including the schottische, polka, waltz, and grapevine; technical emphasis on footwork and partnering.

Dnce 1312. International Folk Dance 2. (1 cr. Prereq–1311, Δ)
Continuation of 1311. Basic folk steps including the schottische, polka, waltz, and grapevine; technical emphasis on footwork and partnering.

Dnce 1313. African Based Movement. (1 cr)
Varied movement of African diaspora, primarily but not limited to West African region and continent of Africa. Traditional movement. Movement inspired by Africa, the Caribbean, and African diaspora at large. In-class movement participation, one movement midterm, one two-page paper.

Dnce 1315. Flamenco. (1 cr)
Basic terminology and movement styles of Spanish Flamenco dance technique. Focuses on arm movements and footwork. Basic choreography. One class period is devoted to viewing videos of traditional Flamenco dance.

Dnce 1317. Arabic Dance. (1 cr)
Basic movements/stylings of dances of Arabic-speaking world. Emphasizes classical women's performing dances of traditional/contemporary movements in Egypt, the Levant, the Arabian Peninsula, North Africa, and Turkey. Body awareness, conditioning, cultural context of movements/dances.

Dnce 1321. Ballroom 1. (1 cr)
Principles of partnering. Elementary steps of the foxtrot, waltz, swing, cha-cha, rumba, and tango.

Dnce 1322. Ballroom 2. (1 cr. Prereq–1321, Δ)
Continuation of 1321. Elementary steps of the foxtrot, waltz, swing, cha-cha, rumba, tango, mamba, and bolero. Partnering, style, and phrasing.

Dnce 1323. Swing Dance. (1 cr)
Traditional swing dances popular in the United States from 1930s through early 1960s. Each week new movements/figures are taught and previous dances reviewed. Students are expected to change partners.

Dnce 1325. Latin Dance. (1 cr)
Basic vocabulary, lead/follow techniques of most popular Latin social dance styles. Salsa, Chacha, Rumba, Merengue. First half of class focuses on basic footwork/partnering; second half focuses on rhythm and musical styling.

Dnce 1331. Yoga. (1 cr)
Theory/practice of Yoga. Standing postures, forward bends, twists, balancing, seated postures, inversions, back bends, guided relaxation/meditation. Proper alignment, weight placement, body awareness, relaxation, breathing techniques. Midterm paper, movement demonstration final.

Dnce 1332. Yoga for Dancers. (1 cr. Prereq–Dance major, Δ)
Physical experience and related aesthetic topics. Historical aspects. Philosophical ideas of yoga. Improving body mechanics through alignment, flexibility, and strength. Developing mental focus/control. Reinforcing positive body language.

Dnce 1335. T'ai Chi Ch'uan. (1 cr)
Ancient Chinese slow-motion exercise. Helping body/mind to become relaxed/centered. Natural movement patterns, deep breathing, tranquil stress-free mind. Self-defense applications of movements. Non-competitive, non-aggressive.

Dnce 1347. Stott Pilates Conditioning. (1 cr)
Essential mat work of Pilates method. Contemporary approach to mind-body system of exercise pioneered by Joseph Pilates. Neuro-muscular resistance exercises to develop strong, flexible muscles and better alignment for optimal physical/mental well-being.

Dnce 1349. Contact Improvisation. (1 cr)
Safe, clear introduction to principles of contact improvisation. Rolling point of contact, supporting/being supported, falling/recovering, connecting with center as source/support for movement. Classes include warm-up.

Dnce 1401. Introduction to Dance. (3 cr)
Modern dance, ballet, and world dance, primarily in the 20th century. Dance forms, choreographers, and dance issues through lecture, discussion, and viewing of live and taped performance.

Dnce 1402. Dance History. (3 cr. Prereq–1401)
"Ways of knowing" in dance history by reading the works of critics, historians, and philosophers who address questions concerning the nature of dance.

Dnce 1500. Topics in Dance. (1-3 cr [max 10 cr])
Topics specified in *Class Schedule.*

Dnce 1601. Dance Improvisation. (1 cr; A-F only. Prereq–Concurrent registration in a modern dance technique course, Δ)
Individual ways of moving linked to fundamental elements of dance: time, space, and energy. Metered time, musical phrasing. Movement speed, shape, and quality. Creative process, individual movement vocabulary, structural devices in dance.

Dnce 1626. Music for Dance. (3 cr. Prereq–1002, 1102 or Δ)
Elements of music theory, form, analysis, and history necessary for the potential dancer, choreographer, and musician to better understand each art.

Dnce 3010. Modern Dance Technique 5. (2 cr [max 4 cr]. Prereq–Δ; audit registration not permitted)
Application of principles of space, time, energy. Alignment, power from pelvic center, rotation/turnout, muscular tonality, joint articulation, clarity of intent, stretch, strength, stamina.

Dnce 3020. Modern Dance Technique 6. (2 cr [max 4 cr]. Prereq–3010 or Δ; audit registration not permitted)
Continuation of 3010. Application of principles of space, time, energy. Alignment, power from pelvic center, rotation/turnout, muscular tonality, joint articulation, clarity of intent, stretch, strength, stamina.

Dnce 3110. Ballet Technique 5. (2 cr [max 4 cr]. Prereq–Δ; audit registration not permitted)
Continuation of beginning technique. Stretch, strength, balance, musicality. Longer phrases in adagio/allegro work. More complex elevations in petit allegro. Practical work conducted in context of study of technical development of ballet.

Dnce 3120. Ballet Technique 6. (2 cr [max 4 cr]. Prereq–3110 or Δ; audit registration not permitted)
Continuation of 3110. Ballet technique. Stretch, strength, balance, musicality. Longer phrases in adagio/allegro work. More complex elevations in petit allegro.

Dnce 3210. Jazz Technique 5. (1 cr [max 2 cr]. Prereq–Δ; audit registration not permitted)
Continuation of jazz technique. Rhythm structures, longer phrases, greater physical speed, attack/control.

Dnce 3220. Jazz Technique 6. (1 cr [max 2 cr]. Prereq–3210 or Δ; audit registration not permitted)
Continuation of 3210. Jazz technique. Rhythm structures, longer phrases, greater physical speed, attack/control.

Dnce 3301. Tap Technique 3. (1 cr. Prereq–1302 or #)
Tap techniques and creative development through improvisational studies.

Dnce 3302. Tap Technique 4. (1 cr. Prereq–3301 or #)
Tap techniques and rhythm structures.

Dnce 3337. Body Mind Centering. (2 cr)
Improvisational movement explorations, hands-on re-patterning work. Direct experience of the way mind (desire, attention, intention) is expressed through various body systems. Students use imagery, touch, and anatomical information to access a range of inner sensations and movement experiences. Emphasizes each individual's unique experience of the body.

Dnce 3401. Dance History 1. (3 cr)
History/theory of dance in varied forms/aspects. From origins of dance as movement-form, through early Renaissance. First half of year-long survey.

Dnce 3402. Dance History 2. (3 cr)
History/theory of dance in varied forms/aspects. From development of ballet, through 20th century modern dance. Second half of year-long survey.

Dnce 3433. Articulate Body. (3 cr. Prereq–Dnce major or minor, Δ)
Lectures and movement sessions in biodynamic considerations for optimal dance performance and metabolistic demands of dance.

Dnce 3487. Ethnic Dance Traditions in American Society. (3 cr)
Traditional dances as preserved and transformed by Native Americans, African-Americans, Latinos, Asian-Americans, and European-Americans in the United States. Interpretation of roles of dance in these cultures.

Dnce 3487W. Ethnic Dance Traditions in American Society. (3 cr)
Traditional dances as preserved and transformed by Native Americans, African-Americans, Latinos, Asian-Americans, and European-Americans in the United States. Interpretation of roles of dance in these cultures.

Dnce 3488. Dance as Cultural Practice. (3 cr)
Study of dance as art, ritual, social activity, and entertainment in selected cultures of Asia, Africa, Eastern Europe, the Middle East, and the Americas.

Dnce 3488W. Dance as Cultural Practice. (3 cr)
Study of dance as art, ritual, social activity, and entertainment in selected cultures of Asia, Africa, Eastern Europe, the Middle East, and the Americas.

Dnce 3500. Topics in Dance. (1-2 cr [max 10 cr])
Topics specified in *Class Schedule*.

Dnce 3601. Dance Composition 1. (3 cr. Prereq–1020 or Δ, concurrent regis in a modern dance technique course)
Movement, vocabulary in relation to theme, space, time, energy, and body parts; solo, duet, and trio forms.

Dnce 3602. Dance Composition 2. (3 cr. Prereq–3601 or Δ, concurrent regis in a modern dance technique course)
Movement, vocabulary in relation to theme, space, time, energy, and body parts; solo, duet, and trio forms.

Dnce 3621. Dance Production I. (2 cr; A-F only. Prereq–Dance major, Δ)
Technical/administrative aspects of dance production. Lighting, costumes, sound, marketing, stage management, fundraising, publicity. Emphasizes practical project management and personal management skills.

Dnce 3622. Dance Production II. (2 cr; A-F only. Prereq–3621, dance major, Δ)
Continuation of 3621. Students produce the spring Student Dance Concert.

Dnce 3700. Performance. (1 cr [max 4 cr]. Prereq–Concurrent regis in a technique class, audition, Δ)
Creation or reconstruction of a dance theatre work under the direction of a guest artist or faculty member. Work is performed at the end of the rehearsal period.

Dnce 3901. Survival Strategies in Dance. (3 cr; A-F only. Prereq–Dance major, Δ)
Strategies fundamental to a dancer's survival. Injury prevention/care. Development of healthy dietary and muscular/skeletal habits. Career tracks.

Dnce 4443. Philosophy and Aesthetics. (3 cr. Prereq–1401)
Major developments in Western philosophic thought on dance and dance theory from its beginnings to the present.

Dnce 4454W. (Re)Writing the Dancing Body. (3 cr)
Modes of verbal expression that best capture the meaning created by primarily non-verbal artistic forms. Chapters from text and issues are discussed/debated in class. Writing during every class period.

Dnce 4601. Dance Composition 3. (3 cr. Prereq–1020, concurrent regis in a modern dance technique course, Δ)
Continuation of movement vocabulary through improvisation, analysis of form and structure, experimentation with tone and performance persona; effects of lights/costumes/text/props/music; development of larger ensemble works.

Dnce 4602. Dance Composition 4. (3 cr. Prereq–4601, concurrent regis in a modern dance technique course, Δ)
Continuation of 4601. Movement vocabulary through improvisation, analysis of form and structure, experimentation with performance persona, and the effects of technical elements. Development of larger ensemble works.

Dnce 4901. Senior Seminar. (2 cr; S-N only. Prereq–Sr, [Dnce or Th major]; offered fall semester only)
Development of senior project, alone or in groups, under guidance of faculty members.

Dnce 5010. Modern Dance Technique 7. (2 cr [max 4 cr]. Prereq–Δ; audit registration not permitted)
Continuation of technical development. Performance range/style. Students study with various guest artists.

Dnce 5020. Modern Dance Technique 8. (2 cr [max 4 cr]. Prereq–5010 or Δ; audit registration not permitted)
Continuation 5010. Performance range/style. Students study with various guest artists.

Dnce 5110. Ballet Technique 7. (2 cr [max 4 cr]. Prereq–Δ; audit registration not permitted)
Continuation of ballet technique. Musicality, performance, stylistic differences. Practical work conducted within context of choreographic/aesthetic development of ballet.

Dnce 5120. Ballet Technique 8. (2 cr [max 4 cr]. Prereq–5110 or Δ; audit registration not permitted)
Continuation of 5110. Musicality, performance, stylistic differences. Practical work conducted within context of choreographic/aesthetic development of ballet.

Dnce 5210. Jazz Technique 7. (1 cr [max 2 cr]. Prereq–Δ; audit registration not permitted)
Continuation of jazz technique. Syncopation, performance projection. Specific styles: swing, bebop, lyrical, funk, latin.

Dnce 5220. Jazz Technique 8. (1 cr [max 2 cr]. Prereq–5210 or Δ; audit registration not permitted)
Continuation of 5210. Syncopation, performance projection. Specific styles: swing, bebop, lyrical, funk, latin.

Dnce 5500. Topics in Dance. (1-2 cr [max 10 cr])
Topics specified in *Class Schedule*.

Dnce 5601. Dance Composition 5. (1 cr. Prereq–4601, 4602, Δ)
Final part of six-semester sequence in dance composition. Exploration of movement through independently scheduled rehearsals. Choreographic concepts. Tools in dance creation, development/refinement of movement, structure of group choreography.

Dnce 5700. Performance. (1 cr [max 4 cr]. Prereq–¶technique course, Δ)
Technique, improvisation, choreography, music, design, and technical production as they relate to dance performance.

Dnce 5858. Teaching Dance. (4 cr. Prereq–1020, Δ or #)
Methods, principles, and techniques of teaching dance.

Dnce 5970. Directed Studies. (1-4 cr [max 10 cr]. Prereq–#, Δ, ❑)
Guided individual study.

Danish (Dan)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

Dan 1001. Beginning Danish. (5 cr)
Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.).

Dan 1002. Beginning Danish. (5 cr. Prereq–1001)
Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and the Danish culture.

Dan 1003. Intermediate Danish. (5 cr. Prereq–1002)
Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments.

Dan 1004. Intermediate Danish. (5 cr. Prereq–1003)
Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments.

Dan 3011. Advanced Danish. (4 cr. Prereq–Passing score on GPT)
To help students achieve advanced proficiency in Danish. Discussion of fiction, film, journalistic and professional prose is complemented by grammar and vocabulary building exercises and a systematic review of oral and written modes of communication.

Dan 3012. Advanced Danish. (4 cr. Prereq–Passing score on GPT)
Discussion of novels, short stories, plays, articles complemented by structural, stylistic, vocabulary building exercises.

Dan 4001. Beginning Danish. (2 cr. §1001. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Dan 1001; see Dan 1001 for course description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dan 4002. Beginning Danish. (2 cr. §1002. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Dan 1002; see Dan 1002 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dan 4003. Intermediate Danish. (2 cr. §1003. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Dan 1003; see Dan 1003 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dan 4004. Intermediate Danish. (2 cr. §1004. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Dan 1004; see Dan 1004 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dental Hygiene (DH)

Department of Preventive Sciences

School of Dentistry

DH 0001. Oral and Maxillofacial Radiology: Preclinic Lab. (1 cr)
Preclinical demonstration and participation phases in oral radiology using mounted human skills.

DH 1191. Dental Hygiene Care Process. (6 cr; A-F only. §1190)
Assessment principles related to medical and oral health status, dental hygiene clinical procedures, and development of instrumentation and hypertension screening skills.

DH 1203. Dental Specialties. (2 cr; S-N only)
Various dental specialties and the dental hygienist's role in services provided.

DH 2111. Dental Anatomy. (2 cr; A-F only)
All deciduous and permanent teeth, including tooth form, function and relationship to oral health; calcification, eruption and exfoliation patterns; ideal static occlusion, dental terminology, and tooth annotation systems. Lab experiences include identification and annotation of teeth and restoration, in wax, of portions of a typodont tooth.

DH 2121. The Dental Hygiene Care Process Clinical Application I. (5 cr; A-F only)
Dental hygiene care process, assessment principles related to medical and oral health status, dental hygiene clinical procedures, and development of instrumentation skills.

DH 2132. Head and Neck Anatomy. (1 cr; A-F only)
Anatomical structures of the head and neck as they relate to the practice of dental hygiene.

DH 2191. Independent Study. (0-6 cr [max 6 cr])
Individually arranged study, instruction, or research with faculty to meet student needs and interests.

DH 2211. Oral Histology and Embryology. (2 cr; A-F only)
Study of the application of pathophysiology to specific organ systems and more extensively the mouth. Emphasis on the identification and management of selected oral conditions.

DH 2212. Dental Hygienist-Patient Relationship. (1 cr; A-F only)
Use of clinical research and evidence-based clinical decision making when communicating scientifically based clinical therapy and treatment modalities; promotion of active participation by patient in clinical decision making.

DH 2221. Periodontology. (3 cr; A-F only)
Periodontal diseases; etiology, assessment and treatment options. Clinical experience in debridement, root planing, and placing periodontal dressings.

DH 2222. The Dental Hygiene Care Process Clinical Application II. (1-4 cr; A-F only)
School of Dentistry clinical systems. Various medical and emergency conditions affecting patient care and preventive strategies for dental diseases. Skill development in fluoride, sealant, and air polishing techniques. Evaluation of products used in the treatment of dental caries and periodontal diseases.

DH 2231. Cariology. (2 cr; A-F only)
Dental caries; etiology, pathology, and prevention.

DH 2235. Oral and Maxillofacial Radiology. (2 cr; A-F only)
General principles of radiology, radiation physics, dosimetry, biology, radiation protection, regulations and recent concepts of imaging.

DH 3111. Biomaterials for the Dental Hygienist. (3 cr; A-F only)
Physical, chemical, and mechanical properties; indications and contraindications for use; manipulation techniques; biological considerations of materials used in dentistry; dental specialties.

DH 3112. General and Oral Pathology. (2 cr; A-F only)
Circulatory disturbances, inflammation, and tumors with emphasis on diseases affecting the oral cavity, dental caries, periodontal diseases, oral neoplasias, and similar problems.

DH 3123. The Dental Hygiene Care Process Clinical Application III. (1-4 cr; A-F only)
Dental hygiene treatment planning, alternative instruments and advanced skills related to the implementation of dental hygiene care. Clinical experience in dental hygiene patient care and dental dietary counseling.

DH 3126. Oral and Maxillofacial Radiology Clinic I. (0 cr; A-F only)
Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 3131. Periodontology I Lecture. (1 cr; A-F only)
Periodontal anatomy; physiology and etiology of periodontal diseases. Clinical, histopathological, and pathogenesis of gingivitis and periodontitis, as well as the role of genetics, tobacco use, and systemic disorders. Preventive and therapeutic procedures associated with diagnosis, prognosis, treatment planning and initial phase of periodontal therapy.

DH 3132. Applied Nutrition in Dental Hygiene Care. (2 cr; A-F only)
Principles of diet and nutrition applied to dental hygiene patient care; skills in dental dietary counseling.

DH 3133. Pharmacology. (2 cr; A-F only. Prereq–Δ)
Principles of pharmacology, physical/chemical properties of drugs, modes of administration, therapeutic/adverse effects, drug actions/interactions.

DH 3134. Dental Hygiene Care for Special Needs Patients I. (2 cr; A-F only)
Knowledge, skills, and attitudes required for providing dental hygiene care for pediatric/orthodontic and geriatric patients and individuals with disabilities.

DH 3135. Oral and Maxillofacial Radiology: Theory, Principles, and Radiographic Analysis. (2 cr; A-F only)
Atomic radiations; characteristics, production, and control of radiographs; radiographic exposures; recent concepts; radiation biology, dosimetry, protection, and regulations. Discrepancies and technical errors in intraoral radiographs; radiographic anatomy; radiographic evidence of deviations from normal anatomic variations.

DH 3191. Independent Study. (0-4 cr [max 6 cr])
Individually arranged study, instruction, or research with faculty to meet student needs and interests.

DH 3203. Dental Hygiene Care for Special Needs Patients I. (2 cr; A-F only)
Knowledge, skills, and attitudes required for providing dental hygiene care for pediatric/orthodontic and geriatric patients and individuals with disabilities.

DH 3221. Local Anesthesia and Pain Management. (2 cr; A-F only)
Concepts in the administration of local anesthesia, nitrous oxide-oxygen sedation, and other methods of pain management. Anatomy, physiology, pharmacology, patient assessment, indications and contraindications, selection of agents, injection techniques, complications, emergency management, and legal and ethical considerations. Lecture, lab, and clinic.

DH 3224W. The Dental Hygiene Care Process Clinical Application IV. (1-4 cr; A-F only)
Evaluation of dental hygiene patient care and assurance of quality in the dental hygiene profession. Clinical experience in dental hygiene patient care.

DH 3225. Extramural Clinical Dental Hygiene. (0-6 cr; S-N only. Prereq–#)
Students participate in educational/clinical experiences with diverse patient populations in community outreach clinics.

DH 3226. Extramural Clinical Dental Hygiene. (0-6 cr; A-F only. Prereq–#)
Students participate in educational/clinical experiences with migrant worker health care program.

DH 3227. Oral and Maxillofacial Radiology Clinic II. (0 cr; A-F only)
Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 3231W. Research Methods in Dental Hygiene. (3 cr; A-F only)
Develop skills in scientific method and analyzing research findings; emphasis on types of research, problem selection, hypothesis writing, research planning and design, data collection and measuring techniques, analysis and interpretation of data, and writing the research proposal.

DH 3235. Dental Hygiene Care for Special Needs Patients II. (2 cr; A-F only)
Knowledge, skills, and attitudes required for providing dental hygiene care for pediatric/orthodontic and geriatric patients and individuals with disabilities.

DH 4125W. The Dental Hygiene Care Process Clinical Application V. (1-6 cr; A-F only)
Adapt dental hygiene care process to meet preventive and treatment needs of traditional and special needs patients. Analyze patient preventive and treatment need through case presentation. Discuss community service, cultural diversity, and family violence issues as well as new products, techniques, and research.

DH 4128. Oral and Maxillofacial Radiology Clinic III. (0 cr; A-F only)
Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 4131. Epidemiology, Prevention, Dental Public Health, and Community Outreach. (3 cr; A-F only)
Epidemiological methods of investigation and patterns of oral diseases; scope and content of the specialty of dental public health; public health process as related to community setting.

DH 4132W. Ethics, Jurisprudence, and Principles of Practice. (2 cr; A-F only)
Career planning, team building, employment seeking, jurisprudence, and ethical decision making.

DH 4137. Patient Management IV (PCG). (1 cr; A-F only)
Small-group, cooperative learning setting integrates dental and dental hygiene students. Apply patient care skills taught in other courses. Focus is on communication skills, patient management, teamwork, collegiality, and practice philosophy.

DH 4191. Independent Study. (0-6 cr [max 6 cr])
Individually arranged study, instruction, or research with faculty to meet student needs and interests.

DH 4226. The Dental Hygiene Care Process Clinical Application VI. (1-5 cr; A-F only)
Adapt dental hygiene care process to meet preventive and treatment needs of traditional and special needs patients. Analyze patient preventive and treatment need through case presentation. Discuss community service, cultural diversity, and family violence issues as well as new products, techniques, and research.

DH 4227. Advanced Dental Hygiene Clinical Experience I. (0-6 cr)
Development of skills in sonic/ultrasonic scaling/assessment, treatment planning, documentation, implementation/evaluation of dental hygiene care.

DH 4228. Advanced Dental Hygiene Clinical Experience II. (0-6 cr)
Development of skills in sonic/ultrasonic scaling/assessment, treatment planning, documentation, implementation/evaluation of dental hygiene care.

DH 4229. Oral and Maxillofacial Radiology Clinic IV. (3 cr; A-F only)
Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 4231. Periodontology III Lecture. (1 cr; A-F only)
Clinical procedures associated with surgical phase of periodontal therapy. Emphasis on evaluation of periodontal treatment as well as the maintenance phase and the relationship between periodontics and other dentistry disciplines. Roles of clinical research in periodontics.

DH 4232. Community Outreach. (1 cr; S-N only)
Dental hygiene education in a variety of community settings.

DH 4233. Legislative, Social, Economic, and Practice Factors in Oral Health. (2 cr; A-F only)
Current status and trends in dentistry in relation to health care promotion, regulation, and delivery and political and legislative process.

DH 4238. Patient Management IV (PCG). (1 cr; A-F only)
Small-group, cooperative learning setting integrates dental and dental hygiene students. Apply patient care skills taught in other courses. Focus is on communication skills, patient management, teamwork, collegiality, and practice philosophy.

DH 4241. Extramural Clinical Dental Hygiene. (0-6 cr [max 6 cr]; A-F only. Prereq–#)
Students participate in educational/clinical experiences with diverse patient populations in community outreach clinics.

DH 4242. Extramural Clinical Dental Hygiene. (0-6 cr; A-F only. Prereq–#)
Students participate in educational/clinical experiences with Jamaica Mission Program.

DH 4250. Dental Hygiene Community Outreach Elective. (0-8 cr; S-N only)
Individually arranged dental hygiene clinical experience in community outreach clinics.

DH 4292. Educational Philosophy and Program Planning. (0-4 cr)
Program planning based on self and faculty assessment; building knowledge and skills to become a self-directed and lifelong learner.

DH 4293. Directed Study. (0-4 cr)
Individual and/or group study on selected topics, and/or problems, with emphasis on selected readings and use of scientific literature. Arranged by student(s) and faculty member(s).

DH 4294. Directed Research. (0-4 cr)
Critical literature review and/or individual empirical research project leading to a written report, and/or intensive observation/participation in the clinical research center.

DH 4295. Information Technology. (0-4 cr)
Individual and/or group study; student(s) select courses/workshops based on individual needs and interests.

DH 4296. Special Topics. (0-4 cr)
Students select topics of current interest from continuing education or other courses based on individual needs.

DH 4297. Topics in Interdisciplinary Healthcare. (0-4 cr)
Individual and/or group study on selected topics related to diversity, cross-cultural health, and interdisciplinary healthcare.

DH 4298. Dental Hygiene Process of Care: Clinical Application. (0-4 cr)
Patient case selection, assessment, documentation, treatment planning, implementation, and evaluation of dental hygiene treatment; case presentations.

DH 4299. Selected Topics in Patient Education. (0-4 cr)
Program development and clinical application; student assesses, plans, implements, and evaluates a patient education program in a clinical setting.

DH 4300. Field/Practice Externship. (0-4 cr)
Clinical and/or community service externship completed on or off campus with diverse population.

Design, Housing, and Apparel (DHA)

Department of Design, Housing, and Apparel
College of Human Ecology

DHA 1101W. Introduction to Design Thinking. (4 cr; A-F only)
Theories/processes that underpin design thinking. Interactions between humans and their natural, social, and designed environments where purposeful design helps determine quality of interaction. Design professions.

DHA 1170. Special Topics in Design, Housing, and Apparel. (1-4 cr [max 16 cr]; A-F only)
In-depth investigation of specific topic, announced in advance.

DHA 1171. Freshman Seminar in Design, Housing, and Apparel. (1-3 cr; A-F only. Prereq–Fr)
Topic in design, housing, or apparel. Small-group seminar.

DHA 1201. Clothing Design, Merchandising, and the Consumer. (3 cr; A-F only)
An orientation to the apparel business covering the multiple steps in the process of creating and merchandising apparel, and the ethical positions reflected in decision making at each step.

DHA 1221. Clothing Assembly Fundamentals. (3 cr; A-F only. Prereq–Pre-clothing design major or #)
Methods/applications of clothing assembly, from micro to macro perspective.

DHA 1311. Foundations: Drawing and Design in Two and Three Dimensions. (4 cr; A-F only. Prereq–DHA major or premajor)
Design elements/principles in context of observational drawing. Integrative approach to two-dimensional design, three-dimensional design, and drawing. Broad conceptual framework for design exploration. Emphasizes perceptual aspects of visual forms.

DHA 1312. Foundations: Color and Design in Two and Three Dimensions. (4 cr; A-F only. Prereq–DHA major or premajor)
Color theory and its application in two- and three-dimensional design. Emphasizes effective use of color by studying traditional color systems, perception, and interaction. Lectures, demonstrations, extensive studio work, critiques.

DHA 1315. Foundations: The Graphic Studio. (4 cr; A-F only. Prereq–DHA major or premajor or #)
Graphic design process. Creative procedure, terminology, technology. Computer applications. Digital illustration, page layouts, image scanning/manipulation.

DHA 1601. Interior Design Studio I. (4 cr; A-F only. Prereq–DHA pre-major)
Theories used to solve interior design problems related to human behavior. Design process. Communication skills that are required for interior design profession.

DHA 1602. Interior Design Studio II. (4 cr; A-F only. Prereq–[DHA pre-major], 1601 with grade of at least C)
Introduction to interior design programming as method for understanding behaviors/requirements of humans in spaces. Use of color in three-dimensional environments. Developing communication skills. Problem-solving.

DHA 2211. Illustration for Clothing Design. (2 cr; A-F only)
Development of illustration skills specific to garments/textiles. Exploration of various traditional media/CAD applications. Critique/analysis of visual communication of clothing design concepts.

DHA 2213. Textile Analysis. (4 cr; A-F only)
Physical, chemical, and biological characteristics of fibers, yarns, textile structures, and finishes. Their effect on performance/appearance of textile products, including clothing, interior, and industrial textiles.

DHA 2214. Softlines Analysis. (3 cr; A-F only. Prereq–1201, 2213)
Physical characteristics of softline products related to function for target market. Class experiences based on methods of analysis, including visual inspection, quality, construction, costing, and fit/sizing.

DHA 2221. Clothing Design Studio I. (4 cr; A-F only. Prereq–[1201 or pass sewing proficiency exam], 1221, 1311, 1312, DHA [major or pre-major])
Theories/methods in designing clothing for various user groups. Relation of a 2-dimensional pattern shape to a 3-dimensional body. Introduction to flat-pattern draping.

DHA 2222. Clothing Design Studio II. (4 cr; A-F only. Prereq–2221, DHA major, pass portfolio review)
Design process in developing clothing for a specific user group. Advanced principles/methods of developing patterns for the body, including advanced flat pattern, draping, fitting. Computer-aided design tools for illustration, patternmaking.

DHA 2311. Drawing and Illustration. (3 cr; A-F only. Prereq–1311, 1312, [DHA major or premajor])
Advanced drawing skills. Illustration concepts/techniques. Illustration assignments for concepts, stories, and ideas.

DHA 2334. Computer Applications I: Digital Composition for Design. (3 cr; A-F only. Prereq–[DHA major or pre-major], 1311, 1312, 1315)
Composition of visual elements in electronic realm. Use of computer to design for traditional media, digital environments.

DHA 2345. Typographic Design. (3 cr; A-F only. Prereq–DHA major, pass portfolio review)
History of typographic forms, principles of composition, expressive potential of type. Design process from problem-solving through exploration, experimentation, selection, critique, and refinement. Readings, research, exercises, design production.

DHA 2351. Graphic Design I: Text and Image. (3 cr; A-F only. Prereq–2345, DHA major, pass portfolio review)
Composition of visual information using grid structures to integrate text/image. Informational/expressive aspects of graphic design, hierarchical relationships of text elements. Methods of text layout that enhance communication.

DHA 2385W. Design and Factors of Human Perception. (4 cr; A-F only. Prereq–DHA major, pass portfolio review)
Introduction to human-factor variables of design. Color perception, type legibility, and other aspects of the human interface with designed objects. Students develop design prototypes. Methods to evaluate effectiveness of designed projects.

DHA 2401. Introduction to Housing. (3 cr; A-F only. Prereq–1101 or #)
Physical, social, economic, psychological aspects of housing design/construction. Housing as process/product in context of the individual, the family, the community. Effects of federal, state, local governmental policies, economic trends.

DHA 2402. Residential Technology. (3 cr; A-F only. Prereq–1101 or ¶1101)
Survey of technological systems in housing with emphasis on the consumption and conservation of natural resources and energy sources, and human factor considerations in kitchen design.

DHA 2463. Housing and Community Development. (3 cr; A-F only. Prereq–1101 or ¶1101)
Meaning/significance of neighborhood/community, residential neighborhood change, impact of housing on neighborhood conditions. Gentrification, displacement, racial segregation, suburbanization, community-based revitalization.

DHA 2603. Interior Design Studio III. (4 cr; A-F only. Prereq–1602 with grade of at least C, pass portfolio review, DHA major)
Expanding presentation skills, visual communication of design process. Design of interior environment as influenced by neighborhood, adjacent structures, regional context, diverse cultures.

DHA 2604. Interior Design Studio IV. (4 cr; A-F only. Prereq–DHA major, 2603 with grade of at least C)
Relationship between exterior/interior design as it pertains to building construction. Methods/materials, principles of structure, mechanical systems. Using 3-D CAD to integrate design concept with interior architectural components, systems, details.

DHA 2612. Interior Materials and Life Safety. (4 cr; A-F only. Prereq–Pass portfolio review, DHA major)
Environmental issues from global to interior spaces. Effect of building codes/legislation. Social awareness on designing for life safety, health, and resource conservation. Functional/aesthetic relation of materials/resources to interior design.

DHA 2613. Lighting Design and Building Systems. (4 cr; A-F only. Prereq–[DHA major, pass portfolio review] or #)
Elements/principles of design merged with functional/aesthetic/human aspects of lighting. Applications/types of lighting technology to solve design problems for interior spaces. Interface of electrical, HVAC, and plumbing systems in buildings.

DHA 2621. Computer Aided Design: Interior Design. (4 cr; A-F only. Prereq–[DHA major, pass portfolio review] or #)
Application of two- and three-dimensional computer drawing in design/visualization of interior space. AutoCAD software used on Windows-based system.

DHA 3217. Fashion: Trends and Visual Analysis. (3 cr; A-F only. Prereq–2213, 2214)
Relation of fashion trends to visual analysis of apparel. Application to design/retail.

DHA 3223. Clothing Design Studio III. (4 cr; A-F only. Prereq–DHA major, 2222, pass portfolio review)
Study tailored/non-tailored clothing structures. Experiment with various materials/structures using traditional/innovative methods. Basic principles of manipulating materials/structures applied to series of garments.

DHA 3224. Clothing Design Studio IV. (4 cr; A-F only. Prereq–3223, DHA major)
Principles/theory of functional clothing design. Conduct/apply research in designing clothing for situations requiring thermal or impact protection, accommodation for mobility, or facilitation for bodily function.

DHA 3243. Visual Merchandising. (3 cr; A-F only. Prereq–1101, 1201)
Study of the retail store environment to address the physical and psychological effects that initiate and motivate consumers' behavior. Aspects of merchandise display include creativity, department layout, fixturing, lighting, cross merchandising, visual resources, signing, and maintenance.

DHA 3245. Nonstore Retailing. (3 cr; A-F only. Prereq–1201)
An overview of nonstore retailing practices that utilize selling strategies other than those found in store formats.

DHA 3312. Color and Form in Surface Design. (3 cr; A-F only. Prereq–DHA major, pass portfolio review)
Use of color/form representation in two-dimensional surface applications. Historical use of color and of spatial representation in visual communication.

DHA 3352. Graphic Design II: Identity and Symbols. (3 cr; A-F only. Prereq–2351, DHA major)
Representation of abstract ideas through symbols. Development of visual identity systems.

DHA 3353. Graphic Design III: Packaging and Display. (3 cr; A-F only. Prereq–3352 or ¶3352, DHA major)
Application of graphic design principles to three-dimensional projects. Principles of three-dimensional design/space applied to labeling/packaging.

DHA 3605. Interior Design Studio V. (4 cr; A-F only. Prereq–2604 with grade of at least C, DHA major)
Advanced interior design problems dealing with small to medium scale spaces. Emphasizes special-needs populations.

DHA 3606. Interior Design Studio VI. (4 cr; A-F only. Prereq–3605 with grade of at least C, DHA major)
Advanced interior design problems dealing with large-scale spaces. Emphasizes environmental concerns.

DHA 3614. Interior Design Ethics and Professional Practice. (4 cr; A-F only. Prereq–2604, pass portfolio review)
The business of interior design, professional ethics, and responsible design are emphasized. Students investigate their responsibility to their business, clients, colleagues, and the community at large. Professional portfolios and credentials will be discussed.

DHA 4001. Design Minor Seminar. (1 cr; A-F only. Prereq–Design minor)
Students share ideas/conclusions with one another, create a summary statement (e.g., document, multi-media display, designed object) of a significant learning insight.

DHA 4121. History of Costume. (4 cr; A-F only. Prereq–General art history course, [jr or sr or grad student])
Survey of clothing/appearances in Western cultures from 18th century to present. Role of gender, race, and class with respect to change in dress within historical moments and social contexts. Research approaches/methods in study/interpretation of dress.

DHA 4131. History of Visual Communication. (4 cr; A-F only. Prereq–Intro history or art history course)
Historical analysis of visual communication with an emphasis on the technological, cultural, and aesthetic influences on graphic design. Examination of how historical events are communicated and perceived through graphic presentation and imagery.

DHA 4161. History of Interiors and Furnishings: Ancient to 1750. (4 cr; A-F only. Prereq–Arch history course or #)
Study of European and American interiors and furnishings including furniture, textiles, and decorative objects.

DHA 4162. History of Interiors and Furnishings: 1750 to Present. (4 cr; A-F only. Prereq–4161 or #)
Study of European and American interiors and furnishings including furniture, textiles, and decorative objects.

DHA 4196. Internship in DHA. (1-4 cr; S-N only. Prereq–Completion of at least one-half of professional sequence, plan submitted and approved in advance by adviser and internship supervisor, written consent of faculty supervisor, #)
Supervised work experience relating activity in business, industry, or government to the student's area of study. Integrative paper or project may be required.

DHA 4212W. Dress, Society, and Culture. (3 cr; A-F only. Prereq–[1101, jr] or grad student)
Contemporary dress from diverse cultures within/outside USA analyzed using social science concepts. Dress as a nonverbal communication system.

DHA 4215. Product Development: Softlines. (4 cr; A-F only. Prereq–2213 or clothing design major or retail merchandising major or grad student or #)
Product development for apparel and other sewn products. Developing products in a laboratory studio setting for effectiveness, reliability, and marketability. Team approach using merchandising and design principles to develop products for specific markets.

DHA 4217. International Developments in Textiles and Apparel. (4 cr; A-F only. Prereq–1201, ApEc 1102, [jr or sr or grad student])
Production, labor, trade, and marketing in textile, apparel, and related goods in global setting.

DHA 4225. Clothing Design Studio V. (4 cr; A-F only. Prereq–3224, DHA major)
Market research information/implementation. Designing for specific audience, market, user group. Applying market research to design line of clothing. Research of promotional methods for design project.

DHA 4226. Clothing Design Studio VI. (4 cr; A-F only. Prereq–4225, DHA major)
Synthesis of clothing design work based on concepts examined in previous studio classes. Principles of mass production applied to design projects completed in 4225. Implementation of public promotion of a clothing line. Individual strategies for promoting career goals. Exhibition/portfolio presentations.

DHA 4241. Retail Promotion. (3 cr; A-F only. Prereq–1201, [Mktg 3001 or equiv], [jr or sr])
Integration of communication/consumer behavior theories with elements of retail promotion. Advertising, sales promotions, point-of-purchase communications, personal selling.

DHA 4242. Retail Buying. (3 cr; A-F only. Prereq–1201, Math 1031, [jr or sr])
Principles/mathematics of merchandise inventory control, merchandise selection.

DHA 4330. Surface Fabric Design Workshop. (4 cr [max 8 cr]; A-F only)
Studio experience in the development and production of surface design. Screen printing, batik, resist dying, shibori, cyanotypes, and dye transfers are included.

DHA 4334. Computer Applications II: Design for the Digital Environment. (3 cr; A-F only. Prereq–[2334 or #], DHA major or grad student, pass portfolio review)
Design of visual communication for electronic environments. Use of software to manipulate/create digital images/animation. Sound/video input combined with graphic images.

DHA 4340. Woven, Knit, and Non-Woven Fiber Design Workshop. (4 cr [max 8 cr]; A-F only)
Studio experiences in the development and production of woven, knit, and non-woven fiber projects. Explore several design methods and complete a major project using one of the structure techniques.

DHA 4345. Advanced Typographic Design. (4 cr; A-F only. Prereq–3352, [DHA major or grad student])
Expressive visual communication of words. Fundamental legibility of 'the invisible art,' overt expression through type. Students complete extended typographic project.

DHA 4351. Design Process: Photography. (3 cr; A-F only. Prereq–[DHA major or grad student], pass portfolio review)
Relationship between photography, design projects. Composition, developing of film, printing.

DHA 4352. Design Process: Bookmaking. (3 cr; A-F only. Prereq–[DHA major or grad student], pass portfolio review)
Construction of traditional/non-traditional book forms. Emphasizes material aspects of handmade books.

DHA 4354. Graphic Design IV: Integrative Campaign. (4 cr; A-F only. Prereq–3353, DHA major)
Multifaceted graphic communication campaign project involving substantial investigation and concept development. Project supports a unified concept for an identified client and is aimed at a specific market or interest group.

DHA 4355. Graphic Design Portfolio. (2 cr; S-N only. Prereq–[4354 or 4365], DHA major)
Preparation of professional portfolio. Discussion of professional issues.

DHA 4365W. Graphic Design Senior Seminar. (4 cr; A-F only. Prereq–4354, DHA major)
Students complete senior research/design project involving social, conceptual, and technical aspects. Capstone course.

DHA 4384. Interactive Media. (3 cr; A-F only. Prereq–[4334 or #], [DHA major or grad student], pass portfolio review)
Design of interactive multi-media projects. Experience developing interactive presentations and electronic publishing. Software includes hypermedia, scripting, video/sound editing, animation, digital output.

DHA 4461. Multifamily Housing Management. (4 cr; A-F only. Prereq–[2401, 2402, 2463] or #)
Multifamily housing development, management approaches, psychosocial impact of housing/community design. Management issues with specific populations (e.g., elderly, families with children). Students conduct post-occupancy evaluation of a housing complex.

DHA 4465. Housing in a Global Perspective. (3 cr; A-F only. Prereq–[2401, 2463] or #)
Housing, its relationship to global patterns of social/economic development examined in comparative framework. Emphasizes housing low income populations in rapidly growing cities of developing countries.

DHA 4482. Residential Environmental Quality. (3 cr; A-F only. Prereq–2402 or #)
Analysis of the residential environment and factors contributing to the degradation of environmental quality and human health. Relationship between the natural environment and human behavior and their influences on environmental quality in housing.

DHA 4607. Interior Design Studio VII. (4 cr; A-F only. Prereq–3606 with grade of at least C, 3614, DHA major)
Sense of place. Contribution of artifacts to interior environments. Historic precedent, adaptive use, renovation, universal design projects.

DHA 4608W. Interior Design Thesis. (6 cr; A-F only. Prereq–4607 with grade of at least C, DHA major)
Current issues that affect interior design research/practice. Methods for programming/solutions. Comprehensive independent interior design project developed from student-conducted research.

DHA 5111. History of Decorative Arts. (4 cr; A-F only. Prereq–General art history survey course or #)
In depth study of textiles, ceramics, metal, and glass from selected historical periods. Focus on the Goldstein Gallery collections.

DHA 5170. Special Topics in Design, Housing, and Apparel. (1-4 cr [max 8 cr]; A-F only. Prereq–Depends on topic, check with dept)
In-depth investigation of a single specific topic, announced in advance.

DHA 5193. Directed Study in Design, Housing, and Apparel. (1-4 cr; A-F only. Prereq–#)
Independent study in design, housing, and apparel under tutorial guidance.

DHA 5196. Field Study: National/International. (1-10 cr [max 10 cr]; A-F only. Prereq–#)
Faculty-directed field study in a national or international setting.

DHA 5216. Textile and Apparel Consumer. (3 cr; A-F only. Prereq–[[1201, 2213] or #], Mktg 4040, [jr or sr or grad student])
Consumer actions concerning textile/clothing products for home and other physical interiors. Personal use as part of daily living in different social, economic, and cultural settings, nationally and internationally.

DHA 5381. Digital Illustration. (3 cr; A-F only. Prereq–4334, [DHA major or grad student])
Integration of design with computer applications. Use of raster-/vector-based programs for illustration.

DHA 5382. Digital Sound and Video. (3 cr; A-F only. Prereq–[4334, [DHA major or grad student]] or #)
Design solutions involving time-based media. Emphasizes sound/video. Electronic publishing via Internet.

DHA 5383. Animation Design. (3 cr; A-F only. Prereq–[4334, [DHA major or grad student]] or #)
Animation in time-based electronic design. Introduction to three-dimensional modeling.

DHA 5385. Internet-Based Media. (3 cr; A-F only. Prereq–[4334, [DHA major or grad student]] or #)
Designing interactive presentations (using various operating systems) for Internet/Web. Electronic publishing. Development of internet-based communication.

DHA 5388. Design Planning, Analysis, and Evaluation. (3 cr; A-F only. Prereq–[4354, DHA major] or grad or #)
Preliminary research, including theoretical, applied, and legal aspects. Planning/developmental models. Design prototyping, testing, and analysis.

DHA 5399W. Theory of Electronic Design. (3 cr; A-F only. Prereq–[DHA major, sr] or grad student or #; offered alternate yrs)
Theories, methodologies, histories of electronic design, its impact on visual communications. Digital artifacts, processes, paradigms.

DHA 5463. Housing Policy. (3 cr; A-F only. Prereq–2401, 2463 or #)
Explore the institutional and environmental settings that make up housing policy in the United States. Examine competing ideas about solving the nation's housing problems through public intervention in the market. Federal and local public sector responses to housing problems will be evaluated.

DHA 5467W. Housing and the Social Environment. (3 cr; A-F only. Prereq–2401 or #)
Housing choices are explored in the context of the social environment with an emphasis on the special needs of the elderly, disabled, minorities, large families, female-headed households, and low-income households.

DHA 5481. Housing for the Elderly and Special Populations. (3 cr; A-F only. Prereq–2401 or #)
Introduction to the changing housing needs of individuals and families across the life span. Particular emphasis will be on housing needs of children, older adults, and persons with disabilities.

DHA 5484. Rural Housing Issues. (3 cr; A-F only. Prereq–2401, 2463 or #)
Housing issues in nonmetropolitan areas. The housing concerns of specific rural populations (e.g., low income, elderly persons, American Indians, migrant workers) are identified and comparisons with urban housing issues are made.

Dutch (Dtch)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

Dtch 1001. Beginning Dutch. (5 cr)
Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.).

Dtch 1002. Beginning Dutch. (5 cr. Prereq–1001)
Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and Dutch culture.

Dtch 1003. Intermediate Dutch. (5 cr. Prereq–1002)
Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments.

Dtch 1004. Intermediate Dutch. (5 cr. Prereq–1003)
Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments.

Dtch 3011. Conversation and Composition. (4 cr. Prereq–Passing score on GPT or #)
Further practice and refinement of spoken and written Dutch beyond the intermediate level; development of compositional skills and vocabulary based on the reading, viewing, and discussion of relevant Dutch and Flemish media reports. Grammar review and development of critical corrective grammatical skills.

Dtch 3012. Conversation and Composition. (4 cr. Prereq–3011)
Further practice and refinement of spoken and written Dutch beyond the intermediate level; development of compositional skills and vocabulary based on the reading, viewing, and discussion of relevant Dutch and Flemish media reports. Grammar review and development of critical corrective grammatical skills.

Dtch 3310. Studies in Dutch Literature. (3 cr [max 9 cr]. Prereq–Reading knowledge of Dutch)
In-depth study of authors or topics from various periods in Dutch literature (e.g., 19th-century Dutch novels, colonial novels, literature of Golden Age). All primary literature is read in the original.

Dtch 3510. Topics in Dutch Culture. (3 cr [max 9 cr]. Prereq–No knowledge of Dutch required)
A single topic or theme of Dutch or Flemish culture explored in depth. Past topics have included Dutch national character, origin of the Batavian myth, and images of Dutchness.

Dtch 3610. Dutch Literature in Translation. (3 cr [max 9 cr]. Prereq–No knowledge of Dutch required)
In-depth study of authors or topics from various periods in Dutch literature. All primary/secondary literature is read in English translation.

Dtch 3993. Directed Studies. (1-5 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided reading in or study of Dutch literature, culture, or advanced language skills.

Dtch 4001. Beginning Dutch. (2 cr. §1001. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Dtch 1001; see Dtch 1001 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dtch 4002. Beginning Dutch. (2 cr. §1002. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Dtch 1002; see Dtch 1002 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dtch 4003. Intermediate Dutch. (2 cr. §1003. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Dtch 1003; see Dtch 1003 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dtch 4004. Intermediate Dutch. (2 cr. §1004. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Dtch 1004; see Dtch 1004 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dtch 5490. Topics in Dutch Literature. (3 cr [max 9 cr])
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in *Class Schedule.*

Dtch 5741. Medieval and Early Modern Dutch. (3 cr)
Introduction to the linguistic aspects of medieval and early modern Dutch. Reading and analysis of representative literary texts from the Dutch Middle Ages to 1700.

Dtch 5993. Directed Studies. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

East Asian Studies (EAS)

Institute of International Studies

College of Liberal Arts

EAS 1462. Introduction to East Asia in Modern Times: 1600-2000. (4 cr)
Formation/decline of early modern Asian empires. Western imperialism, Asian nationalism. Social revolution, economic modernization, cultural change in China, Japan, Korea, Vietnam, 1600-2000.

EAS 3013. Introduction to East Asian Art. (3 cr. §ArtH 3013)
A selective examination of representative works of art produced in China, Korea, and Japan from the neolithic era to modern times. Nearly every major type of object and all major styles are represented.

EAS 3211. Geography of East Asia. (3 cr. §Geog 3211, §Geog 5211)
Physical and human geography of Japan, mainland China and Taiwan, North and South Korea; population pressure, economic and urban development, and international relations.

EAS 3461. Introduction to East Asia I: The Imperial Age. (4 cr. §Hist 3461)
Comparative survey of early history of China, Japan, Korea, and Vietnam; early Chinese thought; diffusion of Confucianism, Buddhism, and other values throughout East Asia; political and social history of region to 1600.

EAS 3462. Introduction to East Asia in Modern Times 1600-2000. (4 cr. §3462)
Formation and decline of early modern Asian empires; Western imperialism and Asian nationalism; social revolution, economic modernization, and cultural change in China, Japan, Korea, and Vietnam between 1600-2000.

EAS 3464. China in the Song, Yuan, and Ming Dynasties. (3 cr. §Hist 3464)
China during the Song (976-1279), Yuan (1279-1368) and Ming (1368-1644) dynasties, political institutions and social structures. Attention to primary sources and how historians ask and answer questions about the past.

EAS 3465W. China in the Ming and Qing Dynasties. (3 cr. §Hist 3465)
The political and social history of China from about 1600 until the end of the Qing dynasty in 1911. Topics include ethnicity, daily life, legal structures, city life, and peasantry.

EAS 3467W. State and Revolution in Modern China. (3 cr. §Hist 3467)
Modern China's political evolution including the Taiping Rebellion, Republican Revolution, rise of Nationalist and Communist parties, Maoist era; reform under Deng Xiaping, and the emergence of democracy in Taiwan.

EAS 3468W. Social Change in Modern China. (3 cr. §Hist 3468)
Opium War and opening of Treaty Ports in 19th century; missionary activity and cultural influence; changes in education system; women's movement; early industrialization; socialism and collectivization after 1949; industrialization of Taiwan; PRC's entry into the world trading system.

EAS 3471. 20th-Century Japan: 1910s to 1990s. (3 cr. §Hist 3471)
World War I, Japan's emergence as an industrial society, world power in the 1920s. Rise of militarism, World War II in the Pacific. Political reform, economic resurgence, cultural change in postwar era.

EAS 3472. Early Modern Japan. (3 cr. §Hist 3472)
Tradition/change in society/culture under Tokugawa shoguns (1600-1867). Growth of cities. Decline of samurai class. Response to Western intrusion.

EAS 3473. Family, School, and Work in Modern Japanese History. (3 cr. §Hist 3473)
Impact of economic, social, and cultural change on males and females in the family, the education system, the employment system from the 17th through 20th centuries.

EAS 3474. The Rise of Modern Japan: 1850s to 1900s. (3 cr; S-N only. §Hist 3474)
The Meiji Revolution from Commodore Perry to the eve of World War I; origins of constitutional monarchy, industrial economy, Western influences, and modern cultural change.

EAS 3661. Japanese Society Today. (3 cr; A-F only. §Soc 3661. Prereq–Soc 1001 or courses on East Asia or experience in East Asia or #)
Major aspects of Japanese society. Forms of social relations and values, religion, childhood, family, community, education, work, business organization, politics, social classes, crime and deviance, police, popular culture, status of women and minorities, social protest movements, and international relations.

EAS 3671. Contemporary Chinese Society: Mainland China, Hong Kong, Taiwan. (3 cr; A-F only. §Geog 3671, §Soc 3671. Prereq–Geog 1301 or Soc 1001or equiv in other social sciences or humanities or #)
Chinese society and culture, with focus on post-1949 mainland China, Taiwan, and Hong Kong. Chinese family, dating and marriage, rural and urban societies, population, work and occupation, socioeconomic development and inequalities, and impacts of post-1978 reforms.

EAS 3940. Topics in Asian History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or #)
Selected topics in Asian history not covered in regular courses.

EAS 4467. Politics and Market in Contemporary Japan. (3-4 cr. §Pol 4467. Prereq–Pol 1054 or 3051 or non-pol sci grad or #)
Study how Japan combined rapid economic development and relative social stability in the postwar period and the problems Japan faces in today's "globalized" world. Focus on major economic and political actors including bureaucracy, business and labor, and the role of political and economic institutions. Assess strengths and weakness of the Japanese-style of capitalism.

EAS 4473. Chinese Politics. (3-4 cr. §Pol 4473)
Focuses on fundamental conflicts in Chinese society; the democracy movement, human rights, class divisions, gender struggles, environmental issues, and capitalist vs. socialist development strategies. Secondary topics include Chinese foreign relations and domestic and foreign political issues in Taiwan.

EAS 4662. Comparative East Asian Development: A New Mode for Growth and Prosperity? (3-4 cr. §Soc 4662. Prereq–3661 or Soc 3661 or related Asian or sociology courses or East Asian experience or #)
Social and cultural reasons for the rapid growth and relative equity of Japan, South Korea, Taiwan, Hong Kong, Singapore and more recently, China. Relation of these examples to more general theories of development.

EAS 5940. Topics in Asian History. (1-4 cr [max 16 cr]. Prereq–Grad or #)
Selected topics such as cultural, economic, intellectual, political, and social history.

Ecology, Evolution, and Behavior (EEB)

Department of Ecology, Evolution, and Behavior
College of Biological Sciences

EEB 1019. Our Changing Planet. (4 cr. Prereq–§Ast 1019, §Geo 1019)
Interdisciplinary study of Earth as a set of interacting, evolving systems—solid earth, oceans, atmosphere, and biosphere—and its relationship with the sun and stars. Cycling of matter and energy in Earth systems, their equilibria, and the effect of natural and human perturbations.

EEB 3001. Ecology and Society. (3 cr; A-F only. §Biol 3407. Prereq–[Jr or sr] recommended; biological sciences students may not apply cr toward major)
Basic concepts in ecology. Organization, development, function of ecosystem. Population growth/regulation. Human effect on ecosystems.

EEB 3361. Visions of Nature: The Natural World and Political Thought. (4 cr. §CSCL 3361; Prereq–Soph or jr or sr; biological sciences students may not apply these credits toward the major)
Theories about the organization of nature, human nature, and their significance for the development of ethics, religion, political and economic philosophy, civics, and environmentalism in Western and other civilizations.

EEB 4014W. Ecology of Vegetation. (3 cr. Prereq–3407, Biol 3007)
Methods of describing, sampling, classifying vegetation. Spatial/temporal variation of vegetation, ecosystem properties on landscapes. Theory of structure/dynamics of terrestrial communities, ecosystems. Analysis of quantitative data. Field trips to local ecosystem types.

EEB 4016W. Ecological Biogeography. (3 cr. Prereq–Biol 3407)
Biotic regions of world in general and North America in detail. Ecological principles of distribution, interpretations of regional/temporal patterns in distribution of vegetation, taxonomic groups of plants/animals. Includes one weekend field trip.

EEB 4129. Mammalogy. (4 cr; A-F only. §FW 4129. Prereq–Biol 1001 or Biol 2012)
Evolutionary and biogeographic history of mammalia. Recognize, identify, and study natural history of mammals at the ordinal level, North American mammals at familial level, and mammals north of Mexico at generic level. Minnesota mammals at specific level. Includes lab.

EEB 4134. Introduction to Ornithology. (4 cr. Prereq–Biol 1001 or Biol 2012)
Structure, evolution, classification, distribution, migration, ecology, habitats, identification of birds. Lecture, lab, weekly field walks. One weekend field trip.

EEB 4136. Ichthyology. (3 cr. §FW 4136. Prereq–Biol 1001 or Biol 2012)
Fish biology, adaptations to different environments and modes of living, and environmental relationships. Lab emphasizes anatomy and identification of Minnesota fishes.

EEB 4601. Limnology. (3 cr; A-F only. §Geo 4601. Prereq–Chem 1022)
Description and analysis of lakes and other aquatic environments beginning with lake origins and progressing through lake physics, chemistry, and biology. Interrelationships among these topics and effects of human activities.

EEB 4605. Limnology Laboratory. (1 cr; A-F only. §Geo 4605. Prereq–4601 or #)
Field and lab methods used to obtain information on environmental conditions in aquatic environments and measure the abundance of aquatic organisms, especially plankton. Field/lab instruments, sampling devices, microscopy, water chemistry, data analysis.

EEB 4607. Plankton Ecology. (4 cr; A-F only. Prereq–4601 or Geo 4601)
Planktonic bacteria, algae, and animals in lakes, reservoirs, and oceans with special attention to processes that cause variations of abundance.

EEB 4609W. Ecosystem Ecology. (3 cr. Prereq–Biol 3407)
Regulation of energy and elements cycling through ecosystems; dependence of the cycles on kinds and numbers of species within ecosystems; effects of human-induced global changes on the functioning of ecosystems.

EEB 4611. Biogeochemical Processes. (3 cr. Prereq–[Chem 2301, [Biol 2032 or MicB 2032 or VPB 2032 or Biol or 3301 or MicB 3301], Phys 1201] or #)
Application of biochemistry, ecology, chemistry, and physics to environmental issues. Current issues in biogeochemistry. Impact of humans on biogeochemical processes in soils, lakes, oceans, estuaries, forests, urban/managed ecosystems, and extreme environments (e.g., early Earth, deep sea vents, thermal springs).

EEB 4631. Global Ecology. (4 cr; A-F only. §Geo 4631. Prereq–[college level ecology course, 2 semesters of [chemistry, high-school physics]] or #)
Interactions between biosphere/lithosphere, atmosphere/oceans throughout Earth history. How climate is influenced on long time scales (evolution of photosynthesis) and on decadal time scales (forest clearance). Earth as an interacting ecosystem. Evaluating future effects of accumulating greenhouse gases.

EEB 4793W. Directed Studies: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Individual study on selected topics or problems. Emphasizes readings, use of scientific literature. Written report.

EEB 4794W. Directed Research: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Laboratory or field investigation of selected areas of research, including written report.

EEB 4814. Plant Community Ecology. (4 cr; A-F only. Prereq–Ecology course)
Communities represented in Itasca Park and vicinity with emphasis on vegetation, patterns of distributions of communities, their interaction with environment and dynamic relationships, methods of community, and description and analysis.

EEB 4817. Vertebrate Ecology. (4 cr; A-F only. Prereq–Ecology course, Δ)
Field studies on vertebrate populations, their relationships to local environments, habitat analysis, and ecological research methods. Work individually or in teams to investigate behavioral and ecological aspects of selected vertebrates. Course supplemented with lectures and field trips.

EEB 4839. Field Studies in Mammalogy. (3 cr; A-F only. Prereq–[College-level biology course that includes study of animals or #], Δ)
Techniques for studying small mammals. lectures and field projects emphasize identification, distributions, community interactions, ecophysiology, and population ecology.

EEB 4842. Arctic Field Ecology. (4 cr; A-F only. Prereq–Basic courses in [ecology, organismal biology], approved application)
Arctic natural history/ecology explored via a four-week trip to Northwest Territories of Canada. Students travel by van, air, and inflatable canoes; design their own research projects; help with ongoing studies in landscape/riparian ecology; learn field skills/techniques associated with ecological studies in Arctic regions; and work directly with local Inuit people about traditional ecological knowledge.

EEB 4844. Field Ornithology. (4 cr; A-F only. Prereq–General biology including zoology, Δ)
Introduction to biology of breeding birds through use of field techniques at Lake Itasca Forestry and Biological Station. Daily field work emphasizes identification, behavioral observations, netting/censusing.

EEB 4993. Directed Studies. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature.

EEB 4994. Directed Research. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Laboratory or field investigation of selected areas of research.

EEB 5008. Forest Response to Quaternary Climate Change. (2 cr; A-F only. Prereq–Biol 3407, EEB 4631 or Geo 4631; ¶EEB 5009)
Forest responses to past climate change at the population, community, and ecosystem level. Response to natural and human disturbance, range shifts and invasions. Limitations to the speed of response to rapid climate change.

EEB 5009. Quaternary Vegetation History and Climate. (2 cr. Prereq– 4631 or Geo 4631 or #)
Reconstructing and dating changes in vegetation and climate from Quaternary pollen stratigraphy of major world biomes; evidence from other indicators of past environments; comparison with climate models.

EEB 5011. Pollen Morphology. (2 cr. Prereq–Biol 3007, PBio 4321 or #)
Morphology and nomenclature of pollen grains and pteridophyte spores, survey of pollen and spores of major plant families, lab techniques.

EEB 5013. Quaternary Plant Macrofossils. (2 cr. Prereq–PBio 4321 or 4511 or #)
Morphology of seeds, fruits, and other macroscopic remains likely to occur in Quaternary deposits, survey of fossils of major plant families, lab techniques.

EEB 5033. Population and Quantitative Genetics. (4 cr. Prereq–[[Biol 4003 or GCD 3022], intro statistics] or #)
Genetic basis of variation in populations and of evolutionary change. Allelic frequency dynamics: emphasizes natural selection, additive genetic variance, and heritability. Current topics related to consequences of artificial selection and of inbreeding.

EEB 5051. Analysis of Populations. (3 cr. Prereq–Intro biology, intro statistics or #)
Factors involved in the regulation, growth, and general dynamics of populations. Data needed to describe populations, population growth, population models, and regulatory mechanisms.

EEB 5053. Ecology: Theory and Concepts. (4 cr. Prereq–Biol 3407 or #)
Classical and modern mathematical theories of population growth, interspecific interactions, ecosystem dynamics and functioning, with emphasis on underlying assumptions and on effects of added biological reality on robustness of predictions, stability, interspecific interactions, ecosystem structure and functioning.

EEB 5122W. Plant Interactions with Animals and Microbes. (4 cr; A-F only. Prereq–Biol 2012 or 3002, 3407 or 3409)
Ecological and environmental implications of mutualistic and antagonistic interactions between plants, animals and microbes at organismal, population, and community levels.

EEB 5221. Molecular and Genomic Evolution. (3 cr; A-F only. Prereq–[[Biol 4003 or GCD 3022], grad student]] or #)
Molecular basis of evolutionary change. Current studies of selection and neutral evolutionary processes at molecular level. Evolution from gene to genome level: protein structure and function, multigene families, organelle genomes, genome organization. Lectures, discussions of current literature, and workshops where students practice analyses.

EEB 5321. Evolution of Social Behavior. (3 cr; A-F only. Prereq–Biol 3411 or #)
Introduction to theories and concepts relating to behavior evolution, mating systems, and cooperative behavior in animals.

EEB 5323. Neural and Endocrine Mechanisms Underlying Vertebrate Behavior. (2 cr; A-F only. Prereq–Biol 3411 or Biol 3101 or NSc 3101 or Phsl 3101 or #)
Selected aspects of the physiological basis of vertebrate behavior with emphasis on neural and endocrine integration and the effects of evolutionary pressures on it. Hormones and sex behavior, sensory perception, neuroethology of communication.

EEB 5327. Behavioral Ecology. (3 cr. Prereq–Biol 3411 or #)
Evolutionary principles applied to aggressive competition, mate choice, cooperation, and parental investment. Optimization models used to examine foraging strategies, predator/prey interactions, and territoriality. Evolution of sex, sexual selection, dispersal. Evolutionary game theory.

EEB 5361. Visions of Nature: The Natural World and Political Thought. (4 cr. Prereq–Advanced studies in history, philosophy, or biology)
Theories about the organization of nature, human nature, and their significance for the development of ethics, religion, political and economic philosophy, civics, and environmentalism in Western and other civilizations. Graduate credit requires paper on conceptual topic on human ecology.

EEB 5371. Principles of Systematics. (3 cr. Prereq–#)
Theoretical and practical procedures of biological systematics. Phylogeny reconstruction, including computer-assisted analyses, morphological and molecular approaches, species concepts and speciation, comparative methods, classification, historical biogeography, nomenclature, and use and value of museums.

EEB 5961. Decision Analysis and Modeling in Conservation Biology. (3 cr; A-F only. Prereq–Conservation biology grad or #)
Active learning class explores decision analysis techniques and modeling in conservation biology. Introduces techniques, concepts, and software.

Economics (Econ)

Department of Economics

College of Liberal Arts

Econ 1101. Principles of Microeconomics. (4 cr. §1104, §1111, §ApEc 1101. Prereq–Knowledge of [plane geometry, advanced algebra])
Microeconomic behavior of consumers, firms, and markets in domestic and world economy. Demand and supply. Competition and monopoly. Distribution of income. Economic interdependencies in the global economy. Effects of global linkages on individual decisions.

Econ 1101H. Honors Course: Principles of Microeconomics. (4 cr. §1101, §1104, §ApEc 1101. Prereq–Math 1271)
Microeconomic behavior of consumers, firms, markets in domestic/world economy. Demand/supply. Competition/monopoly. Distribution of income. Effects of economic interdependencies, global linkages on individual decisions. Emphasizes algebra, geometry, basic logic, proofs.

Econ 1102. Principles of Macroeconomics. (4 cr. §1105, §1112, §ApEc 1102. Prereq–[1101 or equiv], knowledge of [plane geometry, advanced algebra])
Aggregate consumption, saving, investment, and national income. Role of money, banking, and business cycles in domestic and world economy. International trade, growth, and development. U.S. economy and its role in the world economy. International interdependencies among nations.

Econ 1102H. Honors Course: Principles of Macroeconomics. (4 cr. §1102, §1105, §ApEc 1102. Prereq–[1111 or equiv], Math 1271)
Aggregate consumption, saving, investment, and national income. Money, banking, and business cycles in the domestic/global economy. International trade, growth, and development. Role of the United States in world economy, international interdependencies. Emphasizes economic models to explain macroeconomic phenomena.

Econ 1104. Principles of Microeconomics. (4 cr. §1101, §1111, §ApEc 1101. Prereq–Math 1271)
Microeconomic behavior of consumers, firms, and markets in domestic/world economy. Demand and supply. Competition and monopoly. Distribution of income. Effects of economic interdependencies and global linkages on individual decisions. Use of calculus and mathematical models.

Econ 1105. Principles of Macroeconomics. (4 cr. §1102, §1112, §ApEc 1102. Prereq–[1104 or equiv], Math 1271)
Aggregate consumption, saving, investment, national income. Role of money, banking, and business cycles in the domestic/world economy. International trade, growth, and development. U.S./world economy. International interdependencies among nations. Emphasizes calculus and mathematical reasoning.

Econ 1903. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule*.

Econ 1904. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule*.

Econ 1905. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule*.

Econ 1910W. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule*.

Econ 3021. Survey of Economic Ideas. (3 cr. §4022. Prereq–1101, 1102 or equiv, not for econ majors)
A historical and analytical treatment of how important economic ideas developed over time, and their relationship to prevailing economic conditions and politics. Economic ideas from Adam Smith to the present.

Econ 3031. American Economic Problems. (3 cr. §4031. Prereq–1101, [1102 or equiv]; Econ majors consult first with CLA adviser)
American economic problems/relationships. Relevance of simple economic principles to economic problems in the United States.

Econ 3033. Current Economic Issues. (3 cr [max 6 cr]. §4033. Prereq–1101, 1102 or equiv, not for econ majors)
Current controversies over economic policies used to deal with some economic problems. Students focus in part on a specific issue of their choice. Different economic issues are discussed each time the course is offered (every three years).

Econ 3041. Prospective World Economy. (3 cr. §4041. Prereq–[1101, 1102] or equiv or econ major with CLA adviser approval)
What economic future holds. What can be done about global issues. How to improve economic prospects of countries.

Econ 3101. Intermediate Microeconomics. (4 cr. §3105, §3111. Prereq–1101, 1102 or equiv, Math 1271 or equiv)
Behavior of households, firms, and industries under competitive and monopolistic conditions; factors influencing production, price, and other decisions of the firm; applications of the theory. Economic efficiency and distribution of well-being.

Econ 3101H. Honors Course: Intermediate Microeconomics. (4 cr. §3101, §3105. Prereq–1101, 1102 or equiv, Math 1271 or equiv)
Behavior of households, firms, and industries under competitive and monopolistic conditions; factors influencing production, price, and other decisions of the firm; applications of the theory. Economic efficiency and distribution of well-being.

Econ 3102. Intermediate Macroeconomics. (4 cr. §3112. Prereq–3101 or equiv)
Determinants of national income, employment, and price level; effects of monetary and fiscal policies; emphasis on a general equilibrium approach. Applications of the theory, especially to current macroeconomic policy issues.

Econ 3102H. Honors Course: Intermediate Macroeconomics. (4 cr. §3102. Prereq–3101 or equiv)
Determinants of national income, employment, and price level; effects of monetary and fiscal policies; emphasis on a general equilibrium approach. Applications of economic efficiency and distribution of well-being.

Econ 3105. Managerial Economics. (4 cr. §3101, §3111. Prereq–1101, [1102 or equiv], [Math 1271 or equiv]; not open to Econ majors)
Theory of the firm. Managerial decision problems. Demand theory. Production technology and cost concepts. Pricing/output decisions under different market structures. Investment behavior. Government regulation.

Econ 3501. Labor Economics. (3 cr. §4531. Prereq–1101, 1102 or equiv; not open to Econ majors)
Role of labor in economy; labor as factor of production, population, and labor force; economics of labor markets; labor market institutions; theories of wages and employment; unions and collective bargaining; public policy.

Econ 3601. Industrial Organization and Antitrust Policy. (3 cr. §4631, §4639. Prereq–1101, 1102 or equiv; not open to econ majors)
Industrial organization and market structures. Relations between market structure, economic efficiency, and welfare. Purposes and effects of antitrust and related legislation. Industrial policy.

Econ 3611. Environmental Economics. (3 cr. Prereq–1101, 1102, or equiv; not open to Econ majors)
Dependence of the economy on the environment; alternative visions of the future and issues on which actual outcome will depend, particular attention to global warming; future generations and sustainability; economic incentives for environmental protection and degradation; economic aspects of environmental policies.

Econ 3701. Money and Banking. (3 cr. §4721, §4729. Prereq–1101, 1102 or equiv; not open to Econ majors)
Historical development, present characteristics, and economic role of financial institutions. Commercial banking, the Federal Reserve System, and monetary policy.

Econ 3801. Elements of Public Economics. (3 cr. §4821, §5821. Prereq–1101, [1102 or equiv]; not open to Econ majors)
Competing views on proper role of government in economy. Effects of tax/spending policies. Private agents' response to government actions. Optimal policies. Applications primarily to U.S. federal government.

Econ 3951. Major Project Seminar. (2 cr. Prereq–3101, 3102 or equiv, EngC 3027)
Students produce a significant piece of written work in economics. Project should demonstrate critical thinking, collection and analysis of data, problem solving, effective interpretation of findings. Students should attain understanding and proficiency in modes of inquiry in economics.

Econ 3960. Topics in Economics. (3 cr [max 6 cr]. Prereq–1101, 1102 or equiv [others may be stated in *Class Schedule*])
Topics specified in *Class Schedule*.

Econ 3991. Independent Study. (1-3 cr; A-F only. Prereq–[1101, 1102] or #)
Students confirm topic of study with faculty supervisor or with director of undergraduate studies before beginning (otherwise no credit).

Econ 3993. Directed Studies. (1-3 cr; A-F only. Prereq–1101, 1102 or equiv, #)
Guided individual reading or study in areas not available in regular course offerings.

Econ 4021. Economics, Ethics, and Economic Philosophy. (3-4 cr [max 8 cr]. Prereq–1101, 1102 or equiv)
Types of economics, ethics and its economic applications, and bases of different economic philosophies. Topics vary by semester. Examples include relationships between freedoms and responsibilities; economics and ethics of the stakeholder concept; different concepts of property rights or justice.

Econ 4022. Survey of Economic Ideas. (3 cr. §3021. Prereq–3101, 3102 or equiv)
Historical and analytical view of how important economic ideas developed and their relationship to prevailing economic conditions and politics. Economic ideas from Adam Smith to the present.

Econ 4031. American Economic Problems. (3 cr. §3031. Prereq–3101, 3102 or equiv)
Discussion of American economic problems and relationships. Relevance of simple economic principles to economic problems in the United States.

Econ 4033. Current Economic Issues. (3 cr [max 6 cr]. §3033. Prereq–3101, 3102 or equiv)
Current controversies over economic policies used deal with some economic problems. Students focus in part on a specific issue. Different economic issues are discussed every time the course is offered (every three years).

Econ 4041. The Prospective World Economy. (3 cr. §3041. Prereq–3102 or equiv)
Considers what the economic future holds, what can be done now to deal with global issues, and how to improve economic prospects of countries.

Econ 4100W. Undergraduate Writing in Economics. (1-2 cr [max 2 cr]; A-F only. Prereq–3101, [¶4831 or ¶4xxx], #)
Research essay.

Econ 4109H. Honors Course: Game Theory and Applications. (4 cr. Prereq–3101, 3102 or equiv, Math 1271-1272 or equiv)
Games; normal form and extensive form; wars of attrition; games of timing; bargaining applications in industrial organization, macroeconomics, and international economics.

Econ 4113. Introduction to Mathematical Economics. (4 cr. Prereq–3101, 3102 or equiv, Math 1271-1272-2243 or equiv)
Development of selected models of economic behavior in mathematical terms. Topics selected to illustrate the advantages of a mathematical formulation.

Econ 4161. Microeconomic Analysis. (2 cr. Prereq–3101 or 5151 or equiv, Math 2243, Math 2263)
Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. May include topics such as externalities, economics of information and uncertainty. This 7-week course meets with 8001.

Econ 4162. Microeconomic Analysis. (2 cr. Prereq–4161)
Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. May include topics such as externalities, economics of information and uncertainty, and game theory. This 7-week course meets with 8002.

Econ 4163. Microeconomic Analysis. (2 cr. Prereq–4162)
Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. May include topics such as externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 8003.

Econ 4164. Microeconomic Analysis. (2 cr. Prereq–4163)
Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. May include topics such as externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 8004.

Econ 4165. Macroeconomic Theory. (2 cr. Prereq–3102, Math 2243, Math 2263 or equiv or #)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, and prices. This seven-week course meets with 8105.

Econ 4166. Macroeconomic Theory. (2 cr. Prereq–4165)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, and prices. This seven-week course meets with 8106.

Econ 4167. Macroeconomic Theory. (2 cr. Prereq–4166)
General equilibrium models with uncertainty, search, matching, indivisibilities, private information, etc. Implications of theory for measurement and data reporting. Overlapping generations and dynasty models with money and government. Variational and recursive methods. This seven-week course meets with 8107.

Econ 4168. Macroeconomic Theory. (2 cr. Prereq–4167)
General equilibrium models with uncertainty, search, matching, indivisibilities, private information, etc. Implications of theory for measurement and data reporting. Overlapping generations and dynasty models with money and government. Variational and recursive methods. This seven-week course meets with 8108.

Econ 4171. History of Economic Thought. (3 cr. Prereq–3101, 3102 or equiv)
Primarily a critical reading course. Topics include Smith, Ricardo, Malthus, and Marx; neoclassicists, Keynes, the mercantilist and physiocratic doctrines; and modern theory.

Econ 4211. Principles of Econometrics. (4 cr. Prereq–[[1101, 1102] or equiv], Math 2243 [or equiv], [[Stat 3021, Stat 3022] or equiv], familiarity with computers)
Data analysis/quantitative methods in economics. Violation of classical regression model assumptions, modified estimation procedures that retain desirable properties. Multi-equation models. Computer applications/interpretation of empirical results.

Econ 4261. Introduction to Econometrics. (4 cr; A-F only. Prereq–[3101 or equiv], [[Math 1271, Math 1272] or equiv], Math 2243, Math 2263, [[Stat 4101, Stat 4102] or [Stat 5101, Stat 5102]]; Math 4242 strongly recommended)
Review of basic linear regression model, its variants. Time series/simultaneous equation models. Material may include panel data, censored/truncated regressions, discrete choice models.

Econ 4262. Introduction to Econometrics. (4 cr; A-F only. Prereq–4261)
Review of basic linear regression model, its variants. Time series/simultaneous equation models. Material may include panel data, censored/truncated regressions, discrete choice models.

Econ 4301. Economic Development. (3 cr. §4301W, §4331, §4331W. Prereq–[[1101, 1102] or equiv], non-econ major)
Economic growth in low income countries. Theory of aggregate and per capita income growth. Population growth, productivity increases, capital formation. Allocation of resources between consumption and investment and among sectors. International assistance and trade.

Econ 4307. Comparative Economic Systems. (3 cr. §4337. Prereq–1101, 1102 or equiv; not open to Econ majors)
Functions of economic systems; market economy vs. centrally planned economy. Post socialist transitions in Eastern Europe, Russia, and China and reforms undertaken. Initial conditions and strategies for reforms; results of reforms in terms of key economic indicators.

Econ 4311. Economy of Latin America. (3 cr. Prereq–[1101, 1102] or equiv)
Economic evolution in Latin America since 1950. Trade liberalization, poverty, inflation, development strategies in selected Latin American countries. Theory/applications of important issues.

Econ 4313. The Russian Economy. (3 cr. Prereq–1101, 1102 or equiv)
Main features of the Soviet economic system and its economic development from 1971 to 1980s. Collapse of the Soviet Union in 1991. Recent economic reforms adopted by Russia and the Commonwealth of Independent States. Russia and its relations with the world.

Econ 4315. The Japanese Economy. (3 cr. Prereq–1101, 1102 or equiv)
Economic development following contact with western civilization. Issues covered include trade, development and growth, population growth, capital formation, international economic relations, agricultural and industrial policies; role of the government in the economy, and current issues of interest.

Econ 4331W. Economic Development. (3 cr. §4301. Prereq–3101, 3102 or equiv)
Economic growth in low income countries. Theory of aggregate and per capita income growth. Population growth, productivity increases, and capital formation. Allocation of resources between consumption and investment and among sectors. International assistance and trade.

Econ 4337. Comparative Economic Systems. (3 cr. §4307. Prereq–3101, 3102 or equiv)
Functions of economic systems; market economy versus centrally planned economy. Comparison of different economic systems. Post socialist transitions in Eastern Europe, Russia, and China. Initial conditions and strategies for reforms; results of reforms in terms of key economic indicators.

Econ 4401. International Economics. (3 cr. §4401W, §4431, §4431W, §4432, §4432W, §4439. Prereq–[[1101, 1102] or equiv]; not open to econ majors)
International trade flows. Commercial policy and welfare implications, protection. Global trade organizations. International factor mobility. Balance of payments analysis and open-economy macroeconomics. Foreign exchange markets and exchange rate determination. International monetary system. Regional integration.

Econ 4421W. Economic Integration of the Americas. (3 cr. Prereq–3101, 3102 or equiv or #)
Analysis of economic relationships among countries in the Western Hemisphere. Modeling the impact of NAFTA and similar regional trade accords. Prospects for further integration. Comparison with European integration.

Econ 4431V. Honors Course: International Trade. (4 cr. §4431, §4401. Prereq–3101, 3102 or equiv; Math 1271)
Theories of trade and explanations of trade patterns. Trade restrictions and commercial policy. International factor movements. Economic growth, economic development, and trade. Multinational corporations. Regional integration. Transition economies and trade.

Econ 4431W. International Trade. (3 cr. §4401, §4439. Prereq–3101, 3102 or equiv)
Theories of trade and explanations of trade patterns. Trade restrictions and commercial policy. International factor movements. Economic growth, economic development, and trade. Multinational corporations. Regional Integration. Transition economies and trade.

Econ 4432W. International Finance. (3 cr. §4401. Prereq–3101, 3102 or equiv; 4431 or 4439 or equiv recommended)
Balance of payments; international financial markets; exchange rate determination; international monetary system; international investment and capital flows; financial management of the multinational firm; open economy macroeconomic policy.

Econ 4531. Labor Economics. (3 cr. §3501. Prereq–3101, 3102 or equiv)
Economic analysis of labor markets and their operations; population and labor force; labor market institutions; wage and employment theories; unions and collective bargaining; public policy.

Econ 4560. Economics of Discrimination. (3 cr. Prereq–[3101, 3102] or equiv; [Stat 3011, Stat 3022] recommended)
Theory and empirical evidence of labor/consumer markets discrimination. Race/gender differentials. Effects of anti-discrimination policies such as affirmative action. Use of economic models, formal statistical analysis.

Econ 4611H. Honors Course: Environmental Valuation. (4 cr. §4831, §4831W, §4611V. Prereq–[3101 or equiv], [Math 1271 or equiv])
Principles of cost-benefit analysis used for valuing the environment, costs of pollution. Defining, measuring, valuating benefits/costs. Economic growth, sustainable growth. Economic, ecological, ethical issues in using renewable/non-renewable resources. Optimal rate of use. Optimal pollution control.

Econ 4621H. Honors Course: Urban Economics. (4 cr. §4621V. Prereq–3101 or equiv)
Economics of urbanization. Location of economic activity and cities. Central place theory. Site rents and form of city. Urban economic base and economic policy. Urban problems and economic policies: transportation, poverty/segregation, housing, public finance.

Econ 4623. Housing Markets and Public Policy. (3 cr. Prereq–1101, 1102 or equiv)
Analysis of housing markets. Market failures, externalities and the case for government intervention. Relative efficiency of particular forms of intervention.

Econ 4631. Industrial Organization and Antitrust Policy. (3 cr. §3601, §4639. Prereq–3101 or equiv)
Relations between market structure, economic efficiency and welfare. Economic origins of monopoly and other restraints on competition. Purposes and effects of antitrust and related legislation. Industrial policy.

Econ 4631H. Honors Course: Industrial Organization and Antitrust Policy. (4 cr. §4631, §4631V, §3601. Prereq–3101 or equiv)
Economic aspects of antitrust and related policies. Relations between market structure, economic efficiency, and welfare. Economic origins of monopoly and other restraints on competition. Purposes/effects of antitrust/related legislation.

Econ 4721. Money and Banking. (3 cr. §3701, §4729. Prereq–3101 or equiv)
Theories of money demand and money supply. Financial intermediation and banking, banking practices and regulation, role of the Federal Reserve system. Monetary policy.

Econ 4721H. Honors Course: Money and Banking. (4 cr. §3701, §4721, §4721V. Prereq–[3101 or equiv], Math 1271)
Theories of money demand and money supply. Financial intermediation, banking, nonbank financial institutions, banking practices, bank regulation, international banking, role of Federal Reserve system. Monetary policy.

Econ 4731. Macroeconomic Policy. (3 cr. §4739. Prereq–3101, 3102 or equiv)
Monetary vs. fiscal policy debate in the context of the underlying macroeconomic theory controversy. Comparison of Keynesian, Monetarist, and Classical theories; rational expectations; policy ineffectiveness; time inconsistency; rules vs. discretion; budget deficits; unemployment and inflation.

Econ 4731H. Honors Course: Macroeconomic Policy. (4 cr. §4731, §4731V. Prereq–[[3101, 3102] or equiv], Math 1271)
Monetary vs. fiscal policy debate in context of underlying macroeconomic theory controversy. Comparison of Keynesian, Monetarist, and Classical theories. Rational expectations, policy ineffectiveness, time inconsistency, rules versus discretion, budget deficits. Unemployment and inflation.

Econ 4741. Quantitative Analysis of the Macroeconomy. (3 cr. §4749. Prereq–[[3101, 3102] or equiv], [Stat 3011 or equiv])
Development/calibration of growth model. Effects of policies on output, employment, other aggregate variables. Documentation of business cycle facts. Estimation of business cycles' cost. Real business theory, prediction of business cycle facts. Money in augmented model.

Econ 4741H. Honors: Quantitative Analysis of the Macroeconomy. (4 cr. §4741, §4741V. Prereq–[[3101, 3102] or equiv], [Stat 3011 or equiv])
Development/calibration of growth model. Effects of policies on output, employment, and other aggregate variables. Documentation of business cycle facts. Estimation of business cycles' cost. Real business theory. Prediction of business cycle facts. Money in augmented model.

Econ 4751. Financial Economics. (3 cr. §4759. Prereq–3101 or equiv, Math 1271 or equiv, 1 sem statistics)
Financial decisions of firms and investors. Determination of interest rates and asset prices. Role of risk and uncertainty. Emphasis on economic models rather than the details of financial institutions.

Econ 4751H. Honors Course: Financial Economics. (4 cr. §4751. Prereq–3101, [3102 or equiv], [Math 1271 or equiv], [Stat 3011 or equiv])
Efficiency of financial markets. Theoretical concepts, empirical evidence.

Econ 4821. Public Economics. (3 cr. §3801. Prereq–3101, 3102 or equiv)
Competing views on the proper role of government in the economy. Effects of tax and spending policies, taking into account private agents' response to government actions and the ways government officials may use their powers; optimal policies. Applications primarily to U.S. government.

Econ 4831. Cost-Benefit Analysis. (3 cr. §4611V, §4611H, §4619, §4831W. Prereq–3101 or equiv)
Principles for evaluation of benefits/costs of public projects or programs. Issues connected with definition/measurement of benefits/costs. Rate of return, rate of discount. Market imperfections, risk, and uncertainty. Case studies of applications of theory.

Econ 4960. Topics in Economics. (3 cr [max 6 cr]. Prereq–3101, 3102 or equiv; Math 1271 [may change based on topic])
Topics specified in *Class Schedule*.

Econ 4991. Independent Study. (1-4 cr. Prereq–Honors student, topic approved by [faculty supervisor or dir of undergrad studies])
Honors thesis.

Econ 4993. Directed Study. (1-4 cr. Prereq–For honors thesis.)
Guided individual reading or study in areas not available in regular course offerings.

Econ 5151. Elements of Economic Analysis: Firm and Household. (2 cr. Prereq–3101, 3102, or equiv; Math 1271 or equiv; Math 2243 or equiv, grad or #)
Decision-making by households and firms under conditions of perfect competition, monopoly, and monopolistic competition.

Econ 5152. Elements of Economic Analysis: Income and Employment. (2 cr. Prereq–3101, 3102 or equiv; Math 1271 or equiv; Math 2243 or equiv; grad or #)
Determinants of national income, employment, and price level; aggregate consumption, investment, and asset holding.

Econ 5312. Growth, Technology, and Development. (3 cr. Prereq–3101, 3102 or equiv or #)
Economics of research and development; technical change and productivity growth; impact of technology on institutions; science and technology policy.

Econ 5890. Economics of the Health-Care System. (3 cr; A-F only. Prereq–[3101, 3102] or #)
Economic analysis of U.S. health-care sector. Emphasizes problems of pricing, production, distribution. Health-care services as one factor contributing to nation's health.

Education and Human Development (EdHD)

College of Education and Human Development

EdHD 1901. Freshman Seminar, Environment. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1902. Freshman Seminar, Cultural Diversity. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1903. Freshman Seminar, Citizenship/Public Ethics. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1904. Freshman Seminar, International Perspectives. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1905. Freshman Seminar. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1906W. Freshman Seminar, Environment and Writing Intensive. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1907W. Freshman Seminar, Cultural Diversity and Writing Intensive. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1908W. Freshman Seminar, Citizenship/Public Ethics and Writing Intensive. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1909W. Freshman Seminar, International Perspectives and Writing Intensive. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1910W. Freshman Seminar, Writing Intensive. (1-3 cr [max 6 cr]. Prereq–Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 3001. Exploring the Teaching Profession. (1 cr [max 4 cr]; S-N only. Prereq–Early admit for init lic/MEd program, ❑)
Self as teacher, the culture of teaching, students as learners, learning contexts, societal influences on teaching/schools.

EdHD 5001. Learning, Cognition, and Assessment in the Schools. (3 cr; A-F only. Prereq–MEd/init lic student or CLA music ed or preteaching major or #; psych course recommended)
Principles of learning, cognition, cognitive development, classroom management, motivation, instruction, assessment. Approaches include behaviorism, cognitive and social constructivism, human information processing theory. Topics include intelligence, knowledge acquisition, reasoning skills, scholastic achievement, standardized testing, reliability, validity, student evaluation, performance assessment, portfolios, demonstrations. Applications to instruction and organization of curricular materials.

EdHD 5003. Developmental and Individual Differences in Educational Contexts. (3 cr; A-F only. Prereq–MEd/init lic or CLA music ed or preteaching major or #)
Overview of developmental and individual differences of children and adolescents in educational contexts; emphasis on a dynamic systems perspective; developmental transitions in childhood and adolescence; interactions between the student, environment, and task; and accommodations and adaptations for students in special education.

EdHD 5005. School and Society. (2 cr; A-F only. §EdPA 5090. Prereq–MEd/init lic student or CLA music ed major or preteaching major or #)
Readings in history, philosophy, social sciences, and law revealing diverse educational values in a pluralistic society. Multiple expectations of schools. Civil liberties, rights, community. Varying cultural backgrounds of students, family circumstances, exceptional needs.

EdHD 5007. Technology for Teaching and Learning. (1.5 cr; A-F only. §CI 5300. Prereq–[MEd/init lic or CLA music ed major or preteaching major or #], basic computer skills)
Diverse educational technology in K-12 classrooms. Effective use of technology. Computer technologies used to stimulate personal productivity/communication and to enhance teaching/learning processes.

EdHD 5009. Human Relations: Applied Skills for School and Society. (1 cr; A-F only. Prereq–MEd/init lic or CLA music ed or preteaching or #)
Issues of prejudice/discrimination in terms of history, power, social perception. Knowledge/skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, leadership, judgment/decision making, prejudice reduction, conflict resolution, teaching in diverse educational settings.

Educational Policy and Administration (EdPA)

Department of Educational Policy and Administration

College of Education and Human Development

EdPA 1080. Special Topics in Leadership. (1-3 cr [max 6 cr]; A-F only)
For topic, see *Class Schedule*.

EdPA 1301W. Personal Leadership in the University. (3 cr. §PA 1961)
Introduces leadership using a personal leadership framework. Students examine their own views on leadership. Differences between personal/positional leadership, characteristics of leaders within the University, importance of personal development.

EdPA 3010. Special Topics for Undergraduates. (1-3 cr [max 9 cr])
Inquiry into educational policy and administration problems and issues.

EdPA 3021. Introduction to Historical Foundations of Modern Education. (3 cr)
Analysis/interpretation of important elements in modern education derived from pre-classical sources: Greeks, Romans, Middle Ages, Renaissance, Reformation, Enlightenment, Industrial Revolution.

EdPA 3023. Introduction to History of Western Educational Thought. (3 cr)
Great educational classics of Western civilization: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, others.

EdPA 3302W. Leadership in the Community. (3 cr; A-F only. Prereq–[1301W or PA 1961W], [jr or sr], undergrad leadership minor)
Leadership and leadership capacities from multicultural/multidimensional perspectives. Students examine their own views on leadership. Leadership theory/practice, group dynamics/behavior, applying knowledge.

EdPA 3402. Leadership Minor Field Experience. (2 cr; A-F only. Prereq–[3302W or PA 3961W] with grade of at least C, #)
Students integrate lessons learned from core leadership courses, choose from a variety of settings (e.g., community organizations, corporations, University student organizations, education).

EdPA 4303W. Leadership in the World. (3 cr; A-F only. Prereq–[3302W or PA 3961W], completed field experience, undergrad leadership minor)
Leadership theory, community building, social change, interdisciplinary approaches to complex global issues. Students finalize portfolios, submit scholarly products to demonstrate understanding of personal/positional leadership in changing global context. Capstone course.

EdPA 5001. Formal Organizations in Education. (3 cr)
Classical/current theories of organizations. Applications to education and related fields.

EdPA 5021. Historical Foundations of Modern Education. (3 cr)
Analysis and interpretation of important elements in modern education derived from pre-classical sources: Greeks, Romans, Middle Ages, Renaissance, Reformation, Enlightenment, and Industrial Revolution.

EdPA 5023. History of Western Educational Thought. (3 cr)
Great educational classics of Western civilization: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, and others.

EdPA 5024. History of Ideas in American Education. (3 cr)
Readings in American cultural development related to education, including: Franklin, Jefferson, Mann, B.T. Washington, W.E.B. DuBois, Dewey. Special reference to the emerging system of public education in changing contexts, agrarian to urban-industrial, moderate pluralism to intense diversity.

EdPA 5028. Education Imagery in Europe and America. (3 cr)
Images and ideas of education expressed in the visual arts of Western civilization (antiquity to 20th century) in relation to concurrent educational thought and practice; symbolism, myth, propaganda, didacticism, genre, caricature.

EdPA 5032. Comparative Philosophies of Education. (3 cr)
Exploration of the principal philosophies in educational thought today, e.g., realism, idealism, pragmatism, and postmodernism. Practice in philosophical critique.

EdPA 5036. Ethics, Morality, and Values in Education. (3 cr)
Application to key issues of professional practice. Moral education, virtues, principles.

EdPA 5041. Sociology of Education. (3 cr)
Structures and processes within educational institutions; linkages between educational organizations and their social contexts, particularly related to educational change.

EdPA 5044. Introduction to the Economics of Education. (3 cr)
Costs and economic benefits of education, with a focus on K-12; educational markets, prices, and production relationships; investment and cost-benefit analysis.

EdPA 5048. Cross-Cultural Perspectives on Leadership. (2 cr)
Introduction to cultural variables of leadership that influence functioning of cross-cultural groups. Lectures, case studies, discussion, problem-solving, simulations. Intensive workshop.

EdPA 5052. Ethnic Groups and Communities: Families, Children, and Youth. (3 cr)
Roles of young people in widely varied North American communities. Comparative aspects of youth commitment to society, economic value of youth, youth-adult conflict, youth roles in family. Well-defined analyses of contextual roles. Complexity of policy for appropriate educational/community development.

EdPA 5056. Case Studies for Policy Research. (3 cr; A-F only)
Qualitative case study research methods and their applications to educational policy and practice. Emphasis on designing studies that employ open-ended interviewing as primary data collection technique.

EdPA 5061. Ethnographic Research Methods. (3 cr)
Practice in aspects of field methodology below the level of full field study; detailed reading; analysis of studies in anthropology and education for methodological content.

EdPA 5064. Divergent Perspectives in Educational Policy and Practice. (3 cr)
Examines fundamental and current issues in the field of education. Participants learn how to approach an issue from multiple perspectives, develop skills to identify and analyze its component parts, and examine personal belief systems to place a given issue within a personal context.

EdPA 5080. Special Topics: Educational Policy and Administration. (1-3 cr [max 24 cr])
Topical issues in educational policy/administration.

EdPA 5087. Seminar: Educational Policy and Administration. (1-3 cr [max 24 cr])
Shared responsibility of students/instructor in presentation of topics.

EdPA 5095. Problems: Educational Policy and Administration. (1-3 cr [max 24 cr])
Course or independent study on specific topic within department program emphasis.

EdPA 5096. Internship: Educational Policy and Administration. (1-9 cr [max 24 cr])
Internship in elementary, secondary, general, or postsecondary administration, or other approved field related setting.

EdPA 5101. International Education and Development. (3 cr)
Introduction to comparative and international development education, contemporary theories regarding the role of education in the economic, political, and sociocultural development of nations; examination of central topics and critical issues in the field.

EdPA 5102. Knowledge Formats and Applications: International Development Education Contexts. (3 cr)
Analyzes the interrelationships of "knowledge capital" (noetic symbolic resources) and culture through intrinsic, cross-, and multicultural perspectives. Distinguishes knowledge from information and data, focusing on national and international developments occurring along basic and applied knowledge paths.

EdPA 5103. Comparative Education. (3 cr)
Examination of systems and philosophies of education globally with emphasis upon African, Asian, European, and North American nations. Foundations of comparative study with selected case studies.

EdPA 5104. Strategies for International Development of Education Systems. (3 cr; A-F only. Prereq–Grad student)
Strategies for improving quality/efficiency of schooling in developing countries. Introduction to current research on what policy/programmatic interventions have proven most successful in increasing access, raising quality, and improving efficiency of education in developing countries.

EdPA 5121. Educational Reform in International Context. (3 cr)
Critical policy analysis of educational innovation and reform in selected countries. Use theoretical perspectives and a variety of policy analysis approaches to examine actual educational reforms and their implementation.

EdPA 5124. Critical Issues in International Education and Educational Exchange. (3 cr)
Analysis of comprehensive policy-oriented frameworks for international education; practices of U.S. and other universities; conceptual development of international education and its practical application to programs, to employment choices, and to pedagogy.

EdPA 5128. Anthropology of Learning. (3 cr)
Cross-cultural perspectives in examining educational patterns; the implicit and explicit cultural assumptions underlying them. Methods and approaches to cross-cultural studies in education.

EdPA 5132. Intercultural Education and Training: Theory and Application. (3 cr)
Examination of intercultural education; formal and nonformal education programs intended to teach about cultural diversity, promote intercultural communication and interaction skills, and teach students from diverse background more effectively.

EdPA 5301. Contexts of Learning: Historical, Contemporary, and Projected. (3 cr; A-F only)
Contextual understanding of education as a social institution. Education is studied as one institution among the several that constitute its dynamic context.

EdPA 5302. Educational Policy: Context, Inquiry, and Issues. (3 cr)
Review of social science concepts/research in considering educational policies/issues, process of inquiry that affect policy development, implementation, evaluation. Focus on pre-K-12. Role of educational leaders, administrators.

EdPA 5303. Managing the Learning Organization. (3 cr; A-F only)
Examines schools, colleges, and other human service organizations centered on learning. Focuses on perspectives and skills needed to manage organizations effectively.

EdPA 5304. Educational Leadership for Equity, Opportunity, and Outcome. (3 cr)
Implications of multiple contexts in which leadership occurs. Role of followers. Complexities of collaborative structures and of shared governance.

EdPA 5321. The Principalship. (3 cr)
Role of the principal: qualifications, duties, and problems.

EdPA 5322. School Superintendency. (3 cr)
Role/responsibility of superintendent in school district. Emphasizes real life experiences, leadership potential as CEO. Purposes, power, politics, practices of position. Interplay of internal school forces, external community forces analyzed in multiple contexts. Manifestations of leadership in public, high-profile appointment.

EdPA 5324. Financial Management for Elementary-Secondary Education. (3 cr)
Provides an overview of state-local school finance systems, budgeting, governmental fund accounting, and interpretation of financial information. For graduate students pursuing licensure as elementary-secondary principals and superintendents.

EdPA 5328. Introduction to Educational Planning. (3 cr)
Principles, tools, comparative practices, and emerging issues in K-12 and higher education settings; decision making models; strategic and project planning; barriers to effectiveness; and change management processes.

EdPA 5332. Leadership Development Seminar. (3 cr)
Assessment and development of skills required of the educator in planning, decision making, and human relations. Introduction to contemporary issues in educational administration.

EdPA 5336. Laboratory in Decision Making. (3 cr)
Contributions of recent research and theory to effective administration. Analysis of administrative behavior in realistic settings; relations of administration to human behavior.

EdPA 5341. The American Middle School. (3 cr)
Focus on the uniqueness of the early adolescent and appropriate learning situations. For educators working with middle-level students.

EdPA 5344. Legal Aspects of Elementary and Secondary Education. (3 cr)
Overview of legal foundations of elementary/secondary education. Statutory themes, relevant case law, emergent policy issues. Implications for educational organizations and for administrative practice.

EdPA 5346. Politics of Education. (3 cr; A-F only. Prereq–Postbac, MED, or grad student)
Political dimensions of policy formulation/implementation in education. Use of power/influence in shaping educational policies and in resolving conflicts over educational issues. Analysis of consequences/cross-impacts.

EdPA 5348. Public School Personnel Programs. (3 cr)
Management concepts, functions, and practices of the personnel subsystem in education; selection, assignment, evaluation, and development of school personnel; collective bargaining and the grievance process.

EdPA 5352. Projective Leadership for Strategic Learning Communities. (3 cr)
Explores many trends and changes facing society, culture, and education from a strategic learning community perspective; helps students "futurize the present."

EdPA 5356. Contemporary Services for Persons With Disabilities. (3 cr)
Policy, research, and current practices related to education, health, and social services that support children, youth, and adults with special needs, and that support their families. Federal, state, local perspectives.

EdPA 5361. Project in Teacher Leadership. (3-6 cr; S-N only. Prereq–MEd student in Teacher Leadership Program)
Create, implement, evaluate, and present a leadership project designed to initiate positive change in educational environments. Review of related literature, proposal development, project development, implementation and evaluation, critical reflection, sharing learning outcomes.

EdPA 5364. Leadership for School Improvement. (3 cr; A-F only. Prereq–MEd student or #)
Current research/practice on educational leadership focused on creating school cultures conducive to continuous improvement/change. Strategies for personal/organizational leadership in PK-12 settings.

EdPA 5368. Special Services Policy and Administration. (3 cr)
Legislative, procedural, executive, and judicial actions that affect services, families, and children with special needs at all levels of government: federal, state, and local. For administrators, supervisors, and other professionals responsible for managing general, special, and alternative education programs.

EdPA 5372. Youth in Modern Society. (3 cr)
Youth in advanced societies and as a social entity; functions and roles in industrial society, family, education, politics and government, economy and work, welfare and religion; organizations, social movements, and subcultures; empirical research and cross-cultural perspectives.

EdPA 5374. Leadership for Staff Development. (4 cr. Prereq–Postbaccalaureate, at least 3 yrs teaching experience)
Designing, implementing, evaluating staff development in PK-12 settings. Research-based standards for effective staff development. Need for embedded time for collaborative learning, evaluating staff/student outcomes.

EdPA 5376. Organizational Approaches to Youth Development. (3 cr)
Defining youth development within framework of formal and informal organizations; organizational systems responsible for youth development in the community; policy issues surrounding these systems.

EdPA 5378. Experiential Learning: Theory and Practice. (3 cr)
Theory/practice of learning by doing. Educator's personal engagement in process. Technical, motivational, and evaluative aspects.

EdPA 5381. The Search for Children and Youth Policy in the U.S. (3 cr)
Review of contemporary policy issues affecting children and youth in the U.S. and South Africa; identify national standards, norms and principles of youth development; conflicting expectations facing policy-makers; and search for the critical content of youth policy.

EdPA 5384. Collaboration in Heterogeneous Classrooms and Schools. (3 cr; A-F only)
Policy, research, practice base for addressing range of student abilities/backgrounds in diverse schools. Collaborative approaches to curricular, instructional, social support.

EdPA 5396. Field Experience in PK-12 Educational Administration. (3 cr [max 6 cr]; S-N only. Prereq–#)
Field experience or internship arranged for students seeking licensure as PK-12 principal/superintendent. Content/credit depend on licensure requirements specified in individual field experience agreement.

EdPA 5501. Principles and Methods of Evaluation. (3 cr)
Introduction to program evaluation. Planning an evaluation study, collecting and analyzing information, reporting results; evaluation strategies; overview of the field of program evaluation.

EdPA 5521. Cost and Economic Analysis in Educational Evaluation. (3 cr; S-N only)
Use and application of cost-effectiveness, cost-benefit, cost-utility, and cost-feasibility in evaluation of educational problems and programs.

EdPA 5524. Evaluation Colloquium. (1 cr [max 24 cr]; S-N only. Prereq–5501 or EPsy 5243)
Informal seminar of faculty and advanced students interested in the issues and problems of program evaluation.

EdPA 5701. U.S. Higher Education. (3 cr)
U.S. higher/postsecondary education in historical/contemporary perspective. Emphasizes structure, history, and purposes of system as a whole.

EdPA 5704. Student and Faculty Issues in Higher Education. (3 cr)
College student development, curricular/extracurricular activities, faculty work/development, student-faculty interaction.

EdPA 5721. Racial and Ethnic Diversity in Higher Education. (3 cr)
Review of research. Theoretical frameworks, methodological perspectives, and research strategies used to study students, staff, and faculty; historical perspectives.

EdPA 5724. Leadership and Administration of Student Affairs. (3 cr)
Scope, administration, coordination, and evaluation of programs in college and university student affairs.

EdPA 5727. Developmental Education Programs and Postsecondary Students. (3 cr. Prereq–Bachelor's degree)
Focuses on populations served by developmental education programs in the United States and abroad. Defines developmental education. Historical perspective for need for developmental education, student development theories that guide practice in developmental education. Identifying student needs. Model programs, best practices for student retention. Current issues/trends in field.

EdPA 5728. Two-Year Postsecondary Institutions. (3 cr)
Present status, development, functions, organization, curriculum, and trends in postsecondary, but nonbaccalaureate, institutions.

EdPA 5732. The Law and Postsecondary Institutions. (3 cr)
Analysis of court opinions and federal regulations affecting postsecondary educational institutions.

EdPA 5734. Institutional Research in Postsecondary Education. (3 cr; A-F only. Prereq–[5701, (EPsy 5231 or EPsy 8261), grad student] or #)
Scope, role, administration, research strategies, and evaluation of institutional research in postsecondary institutions. Overview of research methodologies, disciplinary foundations of institutional research. Use of institutional, state, and national databases in addressing full range of institutional missions/functions.

Educational Psychology (EPsy)

Department of Educational Psychology

College of Education and Human Development

EPsy 1600. Special Topics: Developing Special Educational and Human Service Programs. (1-4 cr [max 15 cr]. Prereq–#)
Explores the concepts, issues, and practices in developing special education and human services for persons with disabilities. Appropriate for persons in paraprofessional positions.

EPsy 3119. Learning, Cognition, and Assessment. (3 cr; A-F only)
Principles of learning, cognition, cognitive development, classroom management, motivation, instruction, and assessment. Topics: behaviorism, cognitive and social constructivism, human information processing theory, intelligence, knowledge acquisition, reasoning skills, scholastic achievement, standardized testing, reliability, validity, student evaluation, performance assessment, and portfolios.

EPsy 3132. Psychology of Multiculturalism in Education. (3 cr; A-F only)
Course critically examines social and cultural diversity in the United States, confronting social issues of poverty, handicappism, homophobia, racism, sexism, victim-blaming, violence, and so on, and presenting models for change. Students examine how and why prejudices develop.

EPsy 3133. The Psychology of Ethics. (3 cr)
An examination of morality from the perspective of psychology. Exploration of major research traditions and their ethical and educational implications.

EPsy 3264. Basic and Applied Statistics. (3 cr)
Introductory statistics with emphasis on understanding and applying statistical concepts and procedures. Topics include visual and quantitative methods for presenting and analyzing data, common descriptive indices for univariate and bivariate data, and introduction to inferential techniques.

EPsy 3300. Special Topics in Educational Psychology. (1-4 cr [max 9 cr])
Current issues in educational psychology or related coursework in areas not normally available through regular curriculum offerings.

EPsy 4300. Special Topics in Educational Psychology. (1-3 cr [max 9 cr])
Current issues in educational psychology or related coursework in areas not normally available through regular curriculum offerings.

EPsy 5100. Colloquium Series: Research and Issues in Psychological Foundations of Education. (1 cr [max 3 cr]. Prereq–Grad student in psychological foundations of education or #)
Presentation/critique of faculty/student research.

EPsy 5101. Intelligence and Creativity. (3 cr; A-F only)
Contemporary theories of intelligence and intellectual development and contemporary theories of creativity and their implications for educational practices and psychological research.

EPsy 5112. Knowing, Learning, and Thinking. (4 cr; A-F only)
Principles of human information processing, memory, and thought; mental operations in comprehension and problem solving; developing expertise and automaticity; emphasis on applied settings.

EPsy 5113. Psychology of Instruction and Technology. (3 cr)
Introduction to adult learning and instructional design. Application of core foundational knowledge to development of effective learning environments for adults. Topics include philosophy, learning theories, instructional models, development and experience, individual differences, evaluation, assessment, and technology.

EPsy 5114. Psychology of Student Learning. (3 cr; A-F only)
Principles of educational psychology: how learning occurs, why it fails, and implications for instruction. Topics include models of learning, development, creativity, problem-solving, intelligence, character education, motivation, diversity, special populations.

EPsy 5115. Psychology of Adult Learning and Instruction. (3 cr)
Survey of adult learning/instruction. Emphasizes instructional design, learning theories, experience, individual differences, evaluation, tests/measurement, technology. Implications for curricular/instructional design in higher education, continuing education, professional/business related training.

EPsy 5117. Problem Solving and Decision Making. (3 cr; A-F only)
Strategies, rules, methods, and other cognitive components involved in problem solving and decision making, implications for educational practices, and applied domains.

EPsy 5125. Psychology of Building Character, Values, and Behavior. (3 cr; A-F only)
New approaches to motivation, building prosocial values and behavior; how to alter values and behavior of anti-social individuals; strengths and weaknesses of traditional approaches to character education; instilling prosocial values as a way to alter negative behaviors.

EPsy 5135. Human Relations Workshop. (4 cr)
Experiential course addressing issues of prejudice and discrimination in terms of history, power, and social perception. Includes knowledge and skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, effective leadership, judgment and decision-making, prejudice reduction, conflict resolution.

EPsy 5151. Cooperative Learning. (3 cr)
Participants learn how to use cooperative learning in their setting. Topics include theory and research, teacher's role, essential components that make cooperation work, teaching social skills, assessment procedures, and collegial teaching teams.

EPsy 5152. Psychology of Conflict Resolution. (3 cr)
Overview of the field of conflict resolution. Major theories, research, major figures in the field, factors influencing quality of conflict resolution are covered. The nature of conflict, the history of field, and intrapersonal, interpersonal, intergroup conflict, negotiation, mediation are discussed.

EPsy 5154. Organization Development and Change. (3 cr)
Overview of organizational development and change. Normative models of effective organizations, entry and contracting skills, diagnosis procedures and intervention procedures (data feedback, skills training, continuous improvement, mediation).

For definitions of course numbers, symbols, and abbreviations, see page 296.

EPsy 5155. Group Dynamics and Social Influence. (3 cr)
Overview of the field of group dynamics with emphasis on social influence. Major theories, research, and figures in the field are covered. Group goals, communication, leadership, decision making, problem solving, conflicts, power, uniqueness theory, deindividuation, and minority influence will be covered.

EPsy 5156. Social and Personality Influences on Education. (4 cr; A-F only)
Survey of social psychology and personality applied to education. Application of major theories and research to classroom and school practices and educational issues are emphasized. Class sessions include lectures, discussions, simulations, experiential exercises. Intrapersonal, interpersonal, and group dynamics are discussed.

EPsy 5157. Social Psychology of Education. (3 cr; A-F only)
Overview of social psychology and its application to education. Participants study the major theories, research, and major figures in field. Class sessions include lectures, discussions, simulations, role-plays, and experiential exercises.

EPsy 5191. Education of the Gifted and Talented. (3 cr; A-F only)
Theories of giftedness, talent development, instructional strategies, diversity and technological issues, implications for educational practices and psychological inquiry, and international considerations.

EPsy 5200. Special Topics: Psychological Foundations. (1-4 cr [max 30 cr])
Focus on special topics in psychological and methodological concepts relevant to advanced educational theory, research, and practice not covered in other courses.

EPsy 5216. Introduction to Research in Educational Psychology. (3 cr; A-F only. Prereq–5261 or other intro statistics course)
Introduction to educational research, leading students through the basic steps involved in designing and conducting a research study. Topics include reviewing literature, formulating research problem, using different approaches to gather data, managing and analyzing data, and reporting results.

EPsy 5221. Principles of Educational and Psychological Measurement. (4 cr. Prereq–5261 or equiv)
Concepts, principles, and methods in educational/psychological measurement. Reliability, validity, item analysis, scores, score reports (e.g., grades). Modern measurement theories, including item response theory and generalizability theory. Emphasizes construction, interpretation, use, and evaluation of assessments regarding achievement, aptitude, interests, attitudes, personality, and exceptionality.

EPsy 5222. Measurement and Analysis: K-12 Education Accountability. (4 cr. Prereq–5231 or [5221, 5261] or [Psy 3305, Psy 5862] or #)
Methods of educational accountability. Meaning of student/school accountability. Measurement of educational inputs, processes, and results. Data analysis, data use for school improvement.

EPsy 5231. Introductory Statistics and Measurement in Education. (4 cr. §5261, §5263)
Students develop an understanding of basic statistics and measurement concepts and tools and apply them to the collection, analysis, and interpretation of data.

EPsy 5243. Principles and Methods of Evaluation. (3 cr)
Introductory course in program evaluation; planning an evaluation study, collecting and analyzing information, reporting results; overview of the field of program evaluation.

EPsy 5244. Survey Design, Sampling, and Implementation. (3 cr. Prereq–[5221 or 5231 or 5261 or equiv], [CEHD grad student or MEd student])
Survey methods, including mail, phone, and Web-based/email surveys. Principles of measurement, constructing questions and forms, pilot testing, sampling, data analysis, and reporting. Students develop a survey proposal and a draft survey, pilot the survey, and develop sampling/data analysis plans.

EPsy 5246. Evaluation Colloquium: Psychological Foundations. (1 cr [max 8 cr]; S-N only. Prereq–5243/EdPA 5501)
Informal seminar of faculty and advanced students interested in the issues and problems of program evaluation.

EPsy 5261. Introductory Statistical Methods. (3 cr. §5231, §5263)
Application of statistical concepts/procedures. Graphs, numerical summaries. Normal distribution, correlation/regression analyses, probability, statistical inferences for one or two samples. Hypothesis tests, Chi-square tests. Conceptual understanding/application of statistics.

EPsy 5262. Intermediate Statistical Methods. (3 cr. Prereq–5261 or equiv)
Application of statistical concepts/procedures. Analysis of variance, covariance, multiple regression. Experimental design: completely randomized, block, split plot/repeated measures.

EPsy 5263. Statistics for Preprofessional Students. (3 cr. §5231, §5261)
Descriptive statistics for continuous variables, simple regression and correlation, inferences on means, introduction to analysis of variance and multiple regression, contingency tables, and computer analysis techniques.

EPsy 5271. Becoming a Teacher of Statistics. (3 cr. Prereq–5261 or equiv)
Current methods of teaching first courses in statistics. Innovative teaching methods, materials, and technological tools. Types of first courses, reform recommendations, goals for student learning, recommended content, teaching methods, technology, student assessment.

EPsy 5281. Introduction to Computer Operations and Data Analysis in Education and Related Fields. (3 cr; S-N only)
Introductory computer literacy course to familiarize students with personal computers and computing resources at the University. Applications include electronic communications, spreadsheets, graphical presentation, and data analysis.

EPsy 5300. Special Topics in Educational Psychology. (1-9 cr [max 9 cr])
Current issues in educational psychology or related areas not normally available through regular curriculum offerings.

EPsy 5400. Special Topics in Counseling Psychology. (1-4 cr [max 8 cr])
Theory, research, and practice in counseling and student personnel psychology. Topics vary.

EPsy 5401. Counseling Procedures. (3 cr. Prereq–Upper div student)
Emphasis on the counseling relationship and principles of interviewing. Case studies, role playing, and demonstration. For individuals whose professional work includes counseling and interviewing.

EPsy 5412. Introduction to Developmental Counseling and Guidance. (3 cr. Prereq–#)
Contemporary models of counselors as advocates for all students. Emphasizes prevention and systems intervention with counselors involved in the developmental guidance curriculum, school change, staff and community collaboration, individual student planning, and learning success with diverse populations.

EPsy 5421. Leadership and Administration of Student Affairs. (3 cr; A-F only)
Theoretical approaches, administrative structure, and evaluation methods used in college/university student affairs.

EPsy 5422. Principles of Group Work: Theory and Procedures. (3 cr. Prereq–Advanced undergrad or grad student in the helping professions)
Principles and practices of group work for educators and the helping professions. Discussion of various types of groups (e.g., counseling support, task, psychoeducational). Applications to various settings and populations (e.g., schools and community agencies).

EPsy 5432. Foundations of Individual/Organizational Career Development. (3 cr; A-F only)
Introduction to individual and organizational career development theory and practice. Examines critical issues in work patterns, work values, and workplaces in a changing global society, with implications for career planning, development, and transitions, emphasizing personal and organizational change. For nonmajors: serves students in adult ed, HRD, IR, college student advising, and other related fields.

EPsy 5433. Counseling Women Over the Life Span. (3 cr. Prereq–Counseling or career development course)
Counseling skills and interventions to facilitate career development of girls and women of different life stages and backgrounds (school girls to older women); developmental issues from a systematic integrative life planning framework; facts, myths, and trends regarding women's changing roles.

EPsy 5434. Counseling Adults in Transition. (3 cr. Prereq–Advanced undergrad or grad student in the helping professions)
Psychological, physical, and social dimensions of adult transitions (e.g., family and personal relationships, career). Adult development theories, stress and coping, and helping skills and strategies as they relate to adult transition.

EPsy 5451. The College Student. (3 cr)
The psychology and sociology of college students, including research concerning diversity of populations, vocational development of students, student society, culture, mental health, underachievement, dropouts, values and attitudes, and relevant research methods.

EPsy 5461. Cross-Cultural Counseling. (2 cr; A-F only)
Emphasis on the effect of cross-cultural and cross-national psychological differences in human traits and characteristics. These theoretical differences provide a framework for the development and implementation of effective cross-cultural counseling interventions.

EPsy 5601. Survey of Special Education. (2 cr)
Introduction to programs and services provided to people with disabilities in school and community settings. Emphasis on the needs of families, to the roles and responsibilities of teachers, and to related service providers.

EPsy 5602. Computer Technology in Special Education. (2 cr; A-F only)
Develop skills, understand processes, and identify resources needed to utilize technology to benefit persons with disabilities. Emphasis on learning theory, principles of effective instruction, instructional and assistive technology integration.

EPsy 5603. Childhood Language Development: Classroom Implications. (3 cr)
Recent trends and findings in the study of language acquisition and communication; classroom implications, including education of exceptional children and implications of diversity on instruction.

EPsy 5604. Transition from School to Work and Community Living for Persons With Special Needs. (2 cr)
Design of training programs to promote independent living. Vocational and community adjustment for persons with disabilities and who are at-risk. Curriculum materials, methods, and organizational strategies for adolescents and adults, families, and community service providers.

EPsy 5609. Family-Centered Services. (2 cr; A-F only)
Methods for collaborating with families in the education of children with disabilities. Focus on family-centered approach to design of educational plans and procedures. Specific emphasis on multicultural perspectives of family life and expectations for children.

EPsy 5612. Understanding of Academic Disabilities. (3 cr; A-F only)
Introduction to issues related to the education of students with academic disabilities (learning disabilities, mild mental intellectual disabilities, and emotional/behavioral disabilities) including history, definition, assessment, classification, legislation, and intervention approaches.

EPsy 5613. Foundations of Special Education I. (3 cr; A-F only. Prereq–Child development course, 5601 or equiv)
Emphasis on the organization of educational programs and services for people with disabilities and their families. First course for students seeking to become licensed teachers in special education.

EPsy 5614. Foundations of Special Education II. (3 cr; A-F only. Prereq–5613)
Emphasis on assessment, planning, and implementing educational programs for people with disabilities. Second course for students seeking to become licensed teachers in special education.

EPsy 5615. Advanced Academic Interventions. (3 cr; A-F only. Prereq–5612)
Develop knowledge and skills in designing, implementing, and evaluating Individual Educational Plans (IEPs) for students eligible for special education service in learning disabilities, emotional/behavioral disorders, and mild mental intellectual disabilities.

EPsy 5616. Behavior Analysis and Classroom Management. (3 cr)
Introduction to assumptions, principles, and procedures of behavioral approach to analyzing behavior and programs for classroom management. Emphasis on specifying problems, conducting observations, intervening, and evaluating behavioral change.

EPsy 5621. Functional/Basic Academic Interventions in Mental Retardation. (3 cr; A-F only. Prereq–5613, 5614)
Methods and materials course emphasizing functional approaches to promoting academic learning in students with mild to moderate mental retardation and moderate to severe mental retardation.

EPsy 5622. Programs and Curricula for Learners With Severe Disabilities. (3 cr. Prereq–5616)
Emphasis on developing programs and curricula for students with moderate, severe, and profound developmental delays, as well as severe multihandicapping conditions. Special consideration given to preparing children and youth for integrated community environments.

EPsy 5624. Biomedical and Physical Aspects of Developmental Disabilities. (2 cr; A-F only)
Anatomy, physiology, and kinesthiology. Central/peripheral nervous system. Prenatal, perinatal, and postnatal development. Physically disabling conditions. Management/education procedures.

EPsy 5625. Education of Infants, Toddlers, and Preschool Children With Disabilities: Introduction. (2 cr; A-F only)
Overview of the issues, problems, and practical applications in designing early intervention services for young children with disabilities and their families.

EPsy 5626. Seminar: Developmental Disabilities and Instructional Management. (3 cr. Prereq–[5621, 5622] or #)
Data-based strategies for school and nonschool instruction of learners with developmental disabilities including assessment, design, implementation, and evaluation of curriculum and instruction: curriculum content, concept and task analysis, classroom arrangements, natural and instructional cues, corrections, and consequences.

EPsy 5635. Education of Students With Physical and Health Disabilities. (3 cr; A-F only. Prereq–5601 or #)
Introduction to students with physical and health disabilities and their characteristics; the educational implications of physical disabilities; assessment procedures and appropriate educational interventions for learners with physical and health disabilities.

EPsy 5636. Education of Multihandicapped Learners With Sensory Impairments. (2 cr. Prereq–5613, 5614)
Characteristics of learners with visual and auditory impairments; design of instructional programs to remediate or circumvent disabilities, including use of prosthetic devices; related areas of performance affected by sensory impairments.

EPsy 5641. Foundations of Education for Individuals Who Are Deaf/Hard of Hearing. (3 cr)
Historical and current issues related to education of individuals who are deaf or hard of hearing. Implications of causes of hearing loss, social and cultural relationships, philosophies of education, characteristics and legislative guidelines and their applicability to education of individuals who are deaf or hard of hearing.

EPsy 5642. Early Childhood Intervention for Infants, Toddlers, and Preschoolers Who Are Deaf/Hard of Hearing. (3 cr. Prereq–Preservice teacher in deaf education licensing program or #)
Early identification/assessment. Family-centered, interdisciplinary servicing. Program development for infants, toddlers, preschoolers who are deaf/hard of hearing. Presentations, discussions, activities.

EPsy 5644. Language Development and Programming for Deaf/Hard of Hearing Children. (3 cr)
Comparative study of the development of functional language in communicatively disabled and nondisabled individuals. Philosophies, programs, and practices focusing on the development of language with deaf and hard of hearing individuals. Models of assessment and instruction for use in educational settings.

EPsy 5646. Reading and Writing Practices With Deaf/Hard of Hearing Children. (3 cr. Prereq–5644 or general educ methods in tchg reading and writing skills, or #)
Gain knowledge and skills to assess, plan, and implement instruction for children and youth with hearing loss. Emphasis is placed on research, theoretical, and programmatic issues in developing reading and writing skills, curricular adaptations, and effective instructional approaches.

EPsy 5647. Aural and Speech Programming for Persons Who Are Deaf/Hard of Hearing. (3 cr)
Study of the speech and hearing mechanisms, causes of hearing loss, and rehabilitation. Emphasis on instructional practices, aural rehabilitation in the educational setting, adaptive technology, and adaptations to optimize functional skills with individuals who are deaf or hard of hearing.

EPsy 5648. Communication Systems for Children With Disabilities. (2 cr)
Applied study of assessment, selection, and application of alternative communication strategies for infants, children, and youth with disabilities. Emphasis on children with hearing loss and additional disabilities.

EPsy 5649. Models of Instructional Programming With Deaf and Hard of Hearing Students. (3 cr. Prereq–[5641, 5644] or #)
Design/development of portfolios for various models of educational service delivery systems for individuals with hearing loss. Emphasizes consultation skills, curriculum management/modifications, material/technology applications, and support service adaptations.

EPsy 5656. Social and Interpersonal Characteristics of Students With Disabilities. (3 cr; A-F only)
Emphasis on children and youth of school age and on the ways in which their emotional, social, and behavioral disorders affect their functioning in school and on ways in which their behaviors disturb others.

EPsy 5657. Interventions for Social and Emotional Disabilities. (3 cr; A-F only. Prereq–5616, 5656)
Developing comprehensive behavioral programs for students with social and emotional disabilities. Instructing students with social and emotional disabilities.

EPsy 5671. Literary Braille. (3 cr; A-F only)
Mastery of literary braille code including all contractions and short-form words used in Grade 2 English Braille: American Usage. Use of specialized braille writing equipment including, braille writer, slate and stylus, and computer programs with six-key input.

EPsy 5672. Advanced Braille Codes. (2 cr; A-F only. Prereq–5671 or #)
Mastery of the Nemeth code for braille mathematics transcription including elementary math computation, algebra, geometry, trigonometry, and symbolic logic notation. Introduction to foreign languages, computer notation, music, and raised line drawing techniques.

EPsy 5673. Reading and Writing for Children With Visual Disabilities. (2 cr; A-F only. Prereq–5671, CI 5414 or equiv, or #)
Principles of preparation, selection, and use of instructional materials and adaptive technology for children with visual disabilities, including use of braille, large print, auditory tapes, and computer files to access and electronically convert information between these different media.

EPsy 5674. Techniques of Orientation, Mobility, and Independence for Students With Visual Disabilities. (3 cr; A-F only. Prereq–5675 or #)
Introduction to basic techniques to gain skills in pre-cane techniques, orientation to learning environments, and adaptations for activities of daily living and independence. Introduction to mobility maps, consideration of cane, guide dog, and telescopic aids to mobility.

EPsy 5675. Structure and Function of the Eye: Educational Implications. (3 cr; A-F only)
Anatomy and physiology of the eye and its relation to visual perception. Educational considerations for students with low vision studied in relation to ophthalmologic and optometric evaluations and functional vision assessment.

EPsy 5676. Case Management for Children With Visual Disabilities. (3 cr; A-F only. Prereq–5671, 5673, 5675)
Advanced course evaluating and managing cognitive, psychosocial, physical, and academic needs of students. Consideration of parent, teacher, and student in counseling and educational program management.

EPsy 5681. Education of Infants, Toddlers, and Preschool Children With Disabilities: Methods and Materials. (3 cr; A-F only. Prereq–5625)
Overview of the methods and materials available to maximize the developmental and educational outcomes for young children, birth to age 5, with disabilities and their families in home, community, and school based-settings.

EPsy 5701. Practicum: Field Experience in Special Education. (1-6 cr [max 12 cr]; A-F only. Prereq–[5614, [FOE or SpEd grad or licensure student]] or #)
Observations and supervised support of teaching practice in schools or agencies serving children with disabilities in integrated programs.

EPsy 5720. Special Topics: Special Education. (1-4 cr [max 12 cr]. Prereq–#)
Lab and fieldwork approach, often assuming a product orientation, e.g., generation of action plan, creating set of observation field notes, collecting data in some form. Provides opportunities for educational personnel to study specific problems and possibilities related to special education.

EPsy 5740. Special Topics: Interventions and Practices in Educational and Human Service Programs. (1-4 cr [max 8 cr]. Prereq–#)
Concepts, issues, and practices related to the community inclusion of children, youth, and adults with developmental disabilities through weekly seminar and extensive supervised experience working with individuals within the community.

EPsy 5751. Student Teaching: Deaf/Hard of Hearing. (1-6 cr [max 10 cr]. Prereq–#)
Students participate in educational programming for infants, children, and youth who are deaf or hard of hearing, as well as in onsite, directed experiences under the supervision of master teachers of deaf and hard of hearing students.

EPsy 5752. Student Teaching: Learning Disabilities. (1-6 cr [max 10 cr]; S-N only. Prereq–#)
Supervised experience in teaching or related work in schools or other agencies serving children and adolescents with learning disabilities.

EPsy 5753. Student Teaching: Early Childhood Special Education. (1-6 cr [max 8 cr]; S-N only. Prereq–#; completion of all course requirements for license in ECSE)
Supervised experience in teaching or related work in schools, agencies, or home settings with infants, toddlers, and preschoolers with disabilities and their families.

EPsy 5754. Student Teaching: Social and Emotional Disabilities. (1-6 cr [max 8 cr]; A-F only. Prereq–Completion of licensure courses for social and emotional disorders; #)
Teach students with social and emotional disorders at public schools and other appropriate sites. Attend a weekly seminar on student teaching competencies.

EPsy 5755. Student Teaching: Developmental Disabilities, Mild/Moderate. (1-6 cr [max 6 cr]; A-F only. Prereq–Completion of all licensure coursework, #)
Supervised student teaching, or special practicum project, in schools or other agencies serving students at elementary/secondary levels who have mild to moderate developmental disabilities.

EPsy 5756. Student Teaching: Developmental Disabilities, Moderate/Severe. (1-6 cr [max 6 cr]; A-F only. Prereq–Completion of all licensure coursework, #)
Supervised student teaching, or special practicum projects, in schools or other agencies serving students at elementary/secondary levels who have moderate to severe developmental disabilities.

EPsy 5757. Student Teaching: Physical and Health Related Disabilities. (1-6 cr [max 8 cr]; A-F only. Prereq–#)
Supervised student teaching and related work (direct instruction and consultation) in schools or other agencies serving children and adolescents who have physical disabilities.

EPsy 5758. Student Teaching: Visual Impairments. (1-6 cr [max 8 cr]; A-F only. Prereq–#)
Supervised student teaching, or special practicum project, in schools or other agencies serving children and adolescents who have visual impairments.

EPsy 5800. Special Topics in School Psychology. (1-9 cr [max 9 cr])
Current issues in school psychology or areas not normally available through regular curriculum offerings.

EPsy 5801. Assessment and Decision Making in School and Community Settings. (3 cr; A-F only)
Introduction to psychological and educational assessment for individuals who work with children, especially those experiencing academic and behavior problems. Study of standardized group and individual tests of intelligence, achievement, socio-emotional functioning, perception, reading, mathematics, adaptive behavior, and language.

EPsy 5849. Observation and Assessment of the Preschool Child. (3 cr)
Introduction to assessment principles and practices, including observational assessment methods, for children (birth to 5). Intended primarily for teachers in training and others interested in basic information regarding assessment and its relationship to intervention services for young children.

EPsy 5851. Collaborative Family-School Relationships. (2-3 cr. Prereq–Honors senior class or grad student)
Theoretical and empirical bases for creating collaborative family-school relationships for students' development and educational success in school. Emphasis on model programs for K-12 and practical strategies for educational personnel to address National Educational goal 8.

EPsy 5852. Prevention and Early Intervention. (3 cr)
Theory/research base for school-based primary/secondary programs to promote academic/social competence of children/youth (birth to grade 12).

EPsy 5871. Interdisciplinary Practice and Interagency Coordination in Education and Human Services. (3 cr)
Principles and procedures of interdisciplinary practice and interagency coordination. Examine the relative strengths of interdisciplinary approaches, develop skills for collaborating with others, and examine different approaches to interagency coordination.

EPsy 5991. Independent Study in Educational Psychology. (1-8 cr [max 20 cr]; A-F only. Prereq–#)
Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member.

Electrical Engineering (EE)

Department of Electrical and Computer Engineering

Institute of Technology

EE 0001. Refresher Course for Electrical Engineers. (0 cr; A-F only. Prereq–[BSEE or BEE], pass EIT exam, four yrs elec eng experience)
Review of electrical engineering fundamentals required to pass the Minnesota Professional Engineering Examination in electrical engineering. Organized review of material ordinarily contained in electrical engineering college curriculum. Emphasizes problem solving with orientation as close possible to type of questions in exam.

EE 0301. Introduction to Digital System Design: Discussion. (0 cr; S-N only. Prereq–¶2301)
Discussion section to go with 2301.

EE 0361. Introduction to Microcontrollers: Discussion. (0 cr; S-N only. Prereq–¶2361)
Discussion section to go with 2361.

EE 1001. Introduction to Electrical and Computer Engineering. (1 cr; S-N only. Prereq–Lower div IT or Δ)
Introduction to engineering in general and to computer engineering in particular. Exploration of techniques and technologies developed by electrical and computer engineers.

EE 1301. Introduction to Computing Systems. (4 cr. Prereq–High school algebra)
Fundamental concepts of computing systems, from machine level to high-level programming. Transistors, logic circuits. Instruction set architecture. Memory, pointer addressing. Binary arithmetic, data representation. Data types/structures. Assembly language, C programming. Control flow, iteration, recursion. Integral lab.

EE 1701W. Energy, Environment, and Society. (3 cr)
Energy supply and demand; generation of electricity; environmental impact of energy usage; energy conservation methods; utility deregulation; role of communication and computers. Demos, computer simulation, teamwork, and projects.

EE 2001. Introduction to Electronic and Electrical Circuits. (3 cr. Prereq–Phys 1302, ¶Math 2243 or ¶2373 or ¶2573)
Physical principles underlying modeling of circuit elements. Two- and three-terminal resistive elements, Kirchhoff's laws. Independent and dependent sources, opamps. Small signal models for BJT and FET, elementary amplifiers. Simple resistive circuits. Linearity in circuits. First- and second-order circuits. Circuits in sinusoidal steady state.

EE 2002. Introductory Circuits and Electronics Laboratory. (1 cr. Prereq–2001 or ¶2001)
Introductory lab in electronics to accompany 2001. Experiments with simple circuits. Familiarization with basic measurement tools and equipment.

EE 2006. Introductory Circuits Laboratory. (.5 cr)
In combination with 1400, completes the 2002 requirement.

EE 2011. Linear Systems and Circuits. (3 cr. Prereq–2001)
Elements of signals and linear system analysis. Time-domain modeling of linear systems by differential equations. Laplace and Fourier domain modeling and analysis. High frequency models of diodes and transistors and frequency response of amplifiers. Design of electronic filters. Multistage amplifiers.

EE 2101. Introduction to Electronics I. (1.5 cr. §2001. Prereq–Linear circuits)
Diodes, field effect transistors and bipolar junction transistors, small signal transistor models. Amplifier circuits. Covers electronics content of 2001 in half a semester.

EE 2103. Introduction to Electronics II. (1 cr. §2011. Prereq–2001 or 2101)
Active and passive analog filters, high frequency diode and transistor models, amplifier frequency response, multistage amplifiers. Covers electronics content of 2011 in half a semester.

EE 2301. Introduction to Digital System Design. (4 cr. Prereq–Math [1272 or 1372 or 1572], ¶0301)
Boolean algebra, logic gates, combinational logic, logic simplification, sequential logic, design of synchronous sequential logic, VHDL modeling, design of logic circuits. Integral lab.

EE 2361. Introduction to Microcontrollers. (4 cr. Prereq–0301, 2301, CSci [1113 or 1901], ¶0361)
Computer organization, assembly language programming, arithmetic/logical operations, parallel/serial input/output. Microprocessor/microcontroller interfacing: memory design, exception handling, interrups, using special-purpose features such as A/D converters, fuzzy logic, DSP operations. Integral lab.

EE 3005. Fundamentals of Electrical Engineering. (4 cr. Prereq–Math 2243, Phys 1302; not for EE majors)
Fundamentals of analog electronics, digital electronics, and power systems. Circuit analysis, electronic devices and applications, digital circuits, microprocessor systems, operational amplifiers, transistor amplifiers, frequency response, magnetically coupled circuits, transformers, steady state power analysis.

EE 3006. Fundamentals of Electrical Engineering Laboratory. (1 cr. Prereq–¶3005)
Lab to accompany 3005.

EE 3015. Signals and Systems. (3 cr. Prereq–2011)
Basic techniques for analysis and design of signal processing, communications, and control systems. Time and frequency models, Fourier-domain representations, modulation. Discrete-time and digital signal and system analysis. Z transform. State models, stability, feedback.

EE 3019. Signals and Systems Review. (1 cr. Prereq–Math 2243 or #)
Linear systems, Laplace transforms. Discrete-time systems, z-transform and its inverse, unilateral z-transform. Transfer function time, frequency analysis.

EE 3025. Statistical Methods in Electrical and Computer Engineering. (3 cr. Prereq–3015)
Notions of probability. Elementary statistical data analysis. Random variables, densities, expectation, correlation. Random processes, linear system response to random waveforms. Spectral analysis. Computer experiments for analysis and design in random environment.

EE 3101. Circuits and Electronics Laboratory I. (2 cr. Prereq–[3115 or ¶3115], 2002)
Experiments in circuits/electronics.

EE 3102. Circuits and Electronics Laboratory II. (2 cr. Prereq–3101)
Experiments in circuits and electronics; team design project.

EE 3105. Circuits and Electronics Transition Laboratory. (.75 cr; A-F only. Prereq–3015)
Together with 3400, completes the 3101 requirement.

EE 3115. Analog and Digital Electronics. (4 cr. Prereq–3015 or ¶3015)
Feedback amplifiers. Stability and compensation. Oscillators. Internal structure of operational amplifiers. Switching active devices. BJT and FET logic gates. Sequential circuits. Designing complex digital circuits.

EE 3161. Semiconductor Devices. (3 cr. Prereq–Upper div IT, 2011, Phys 1302, Phys 2303 or Chem 1022)
Elementary semiconductor physics; physical description of pn junction diodes, bipolar junction transistors, field-effect transistors.

EE 3165. Introduction to Microelectronic Devices With Applications. (3 cr. Prereq–[2001, [3005 or MatS 3011]] or #)
Basic properties of semiconductors, junction diodes. Applications to emitters, MOSFETs, detectors, optical devices, magnetic devices. Micromechanical systems. Nanoelectronics.

EE 3601. Transmission Lines. (3 cr. Prereq–2011, [Math 2243 or Math 2373 or Math 2573], [Phys 1302 or Phys 1402])
Transmission line circuit interconnections. Time/frequency domain behavior of infinite/terminated transmission lines/line segments as circuit components. Calculating transmission line parameters using electrostatics/magnetostatics.

EE 3961. Industrial Assignment I. (1 cr; S-N only. Prereq–Admission to ECE co-op)
Industrial work assignment in Electrical and Computer Engineering co-op program. Grade based on student's written report of semester's assignment, but deferred until completion of 4961.

EE 4111. Analog Electronics Design With Operational Amplifiers. (4 cr. Prereq–3015, 3115; no EE or CompE grad cr)
Characteristics of operational amplifiers. Applications of operational amplifiers, including A/D and D/A converters. Compensation of operational amplifiers. Power amplifiers. Semiconductor controlled rectifiers, applications. Linear/switching voltage regulators.

EE 4231. Linear Control Systems: Designed by Input/Output Methods. (3 cr. Prereq–[3015, [upper div IT or grad student in IT major]] or #; no [EE or CompE] grad cr)
Modeling, characteristics, and performance of feedback control systems. Stability, root locus, and frequency response methods. Digital implementation, hardware considerations.

EE 4233. State Space Control System Design. (3 cr. Prereq–[3015, upper div IT] or #; no [EE or CompE] grad cr)
State space models, performance evaluation, numerical issues for feedback control. Stability, state estimation, quadratic performance. Implementation, computational issues.

EE 4235. Linear Control Systems Laboratory. (1 cr. Prereq–4231 or ¶4231; no EE or CompE grad cr)
Lab to accompany 4231.

EE 4237. State Space Control Laboratory. (1 cr. Prereq–4233 or ¶4233; no cr for [EE or CompE] grad students)
Lab to accompany 4233.

EE 4301. Digital Design With Programmable Logic. (4 cr. Prereq–2301, CSci 1113 or CSci 1901)
Introduction to system design and simulation. Design using VHDL code and synthesis. Emulation using VHDL code.

EE 4341. Microprocessor and Microcontroller System Design. (4 cr. Prereq–2301, 2361, upper div IT; no EE or CompE grad cr)
Microprocessor interfacing. Memory design. Exception handling/interrupts. Parallel/serial input/output. Bus arbitration control. Multiprocessor systems. Direct memory access (DMA). Designing dynamic RAM memory systems. Special DRAM modes. Interleaved memory. Advanced bus structures. Integral lab.

EE 4501. Communications Systems. (3 cr. Prereq–3025; no EE or CompE grad cr)
Systems for transmission/reception of digital/analog information. Characteristics/design of wired/wireless communication systems. Baseband, digital, and carrier-based techniques. Modulation. Coding. Electronic noise and its effects on design/performance.

EE 4505. Communications Systems Laboratory. (1 cr. Prereq–4501 or ¶4501; no EE or CompE grad cr)
Experiments in analysis/design of wired/wireless communication systems. Lab to accompany 4501.

EE 4541. Digital Signal Processing. (3 cr. Prereq–[3015, 3025] or #)
Review of linear discrete time systems and sampled/digital signals. Fourier analysis, discrete/fast Fourier transforms. Interpolation/decimation. Design of analog, infinite-impulse response, and finite impulse response filters. Quantization effects.

EE 4601. Electromagnetics for RF Engineering and Optics. (4 cr; A-F only. Prereq–3601 or equiv; no EE grad cr, no CompE grad cr)
Electrostatics, magnetostatics, electromagnetic induction, Maxwell's equations, wave propagation in free space, guides, reflections from perfect conducting and from dielectric interfaces, resonators/antennas. Foundation for rf/microwave engineering.

EE 4701. Electric Drives. (3 cr. Prereq–3015)
AC/DC electric-machine drives for speed/position control. Integrated discussion of electric machines, power electronics, and control systems. Computer simulations. Applications in electric transportation, robotics, process control, and energy conservation.

EE 4721. Introduction to Power System Analysis. (4 cr. Prereq–2011)
AC power systems; analysis of large power system networks; mathematics and techniques of power flow analysis, short circuit analysis, and transient stability analysis; use of a power system simulation program for design. Integral lab.

EE 4741. Power Electronics. (3 cr. Prereq–3015, 3115)
Switch-mode power electronics. Switch-mode DC power supplies. Switch-mode converters for DC and AC motor drives, wind/photovoltaic inverters, interfacing power electronics equipment with utility system. Power semiconductor devices, magnetic design, electro-magnetic interference (EMI).

EE 4951W. Senior Design Project. (2 cr. Prereq–3015, 3115, 3601; attendance first day of class required)
Team participation in formulating/solving open-ended design problems. Oral/written presentations.

EE 4961. Industrial Assignment II. (2 cr; S-N only. Prereq–3961, ECE co-op; no grad cr)
Industrial work assignment in ECE co-op program. Grade based on student's formal written report covering semester's work.

EE 4962. Industrial Assignment III. (1 cr; S-N only. Prereq–4961, EE co-op, Δ; no grad cr)
Industrial work assignment in ECE co-op program. Formal written report covering semester's work.

EE 4970. Directed Study. (1-3 cr. Prereq–Cr ar [may be repeated for cr]; Δ)
Studies of approved projects, either theoretical or experimental.

EE 4981H. Senior Honors Project I. (2 cr. Prereq–ECE honors, sr, #)
Experience in research/design for electrical/computer engineering. Oral/written reports.

EE 4982V. Senior Honors Project II. (2 cr. Prereq–4981H)
Experience in research/design for electrical/computer engineering. Oral/written reports.

EE 5121. Transistor Device Modeling for Circuit Simulation. (3 cr. Prereq–[3115, 3161] or #)
Basics of MOS, bipolar theory. Evolution of popular device models from early SPICE models to current industry standards.

EE 5141. Integrated Sensors and Transducers. (4 cr. Prereq–3161, 3601)
Microelectromechanical systems composed of microsensors, microactuators, and electronics integrated onto common substrate. Design, fabrication, and operation principles. Labs on micromachining, photolithography, etching, thin film deposition, metallization, packaging, and device characterization.

EE 5163. Semiconductor Properties and Devices I. (3 cr. Prereq–3161, 3601 or #)
Principles and properties of semiconductor devices. Selected topics in semiconductor materials, statistics, and transport. Aspects of transport in p-n junctions, heterojunctions.

EE 5164. Semiconductor Properties and Devices II. (3 cr. Prereq–5163 or #)
Principles and properties of semiconductor devices. Charge control in different FETs, transport, modeling. Bipolar transistor models (Ebers-Moll, Gummel-Poon), heterostructure bipolar transistors. Special devices.

EE 5171. Microelectronic Fabrication. (4 cr. Prereq–IT sr or grad)
Fabrication of microelectronic devices; silicon integrated circuits, GaAs devices; lithography, oxidation, diffusion; process integration of various technologies, including CMOS, double poly bipolar, and GaAs MESFET.

EE 5173. Basic Microelectronics Laboratory. (1 cr. Prereq–5171 or ¶5171)
Students fabricate a polysilicon gate, single-layer metal, NMOS chip, performing 80 percent of processing, including photolithography, diffusion, oxidation, and etching. In-process measurement results are compared with final electrical test results. Simple circuits are used to estimate technology performance.

EE 5231. Linear Systems and Optimal Control. (3 cr. Prereq–IT grad, 3015 or #)
Properties and modeling of linear systems; linear quadratic and linear-quadratic-Gaussian regulators; maximum principle.

EE 5235. Robust Control System Design. (3 cr. Prereq–IT grad, 3015, 5231 or #)
Development of control system design ideas; frequency response techniques in design of single-input/single-output (and MI/MO) systems. Robust control concepts. CAD tools.

EE 5301. VLSI Design Automation I. (3 cr. Prereq–2301 or #)
Basic graph/numerical algorithms. Algorithms for logic/high-level synthesis. Simulation algorithms at logic/circuit level. Physical-design algorithms.

EE 5302. VLSI Design Automation II. (3 cr. Prereq–5301 or #)
Basic algorithms, computational complexity. High-level synthesis. Test generation. Power estimation. Timing optimization. Current topics.

EE 5323. VLSI Design I. (3 cr. Prereq–[2301, 3115] or #)
Combinational static CMOS circuits. Transmission gate networks. Clocking strategies, sequential circuits. CMOS process flows, design rules, structured layout techniques. Dynamic circuits, including Domino CMOS and DCVS. Performance analysis, design optimization, device sizing.

EE 5324. VLSI Design II. (3 cr. Prereq–5323 or #)
CMOS arithmetic logic units, high-speed carry chains, fast CMOS multipliers. High-speed performance parallel shifters. CMOS memory cells, array structures, read/write circuits. Design for testability, including scan design and built-in self test. VLSI case studies.

EE 5327. VLSI Design Laboratory. (3 cr. Prereq–[4301, [5323 or ¶5323]] or #)
Complete design of an integrated circuit. Designs evaluated by computer simulation.

EE 5329. VLSI Digital Signal Processing Systems. (3 cr. Prereq–5323 or ¶5323 or #)
Programmable architectures for signal/media processing. Data-flow representation. Architecture transformations. Low-power design. Architectures for two's complement/redundant representation, carry-save, and canonic signed digit. Scheduling/allocation for high-level synthesis.

EE 5333. Analog Integrated Circuit Design. (3 cr. Prereq–[3115, grad student] or #)
Fundamental circuits for analog signal processing. Design issues associated with MOS/BJT devices. Design/testing of circuits. Selected topics (e.g., modeling of basic IC components, design of operational amplifier or comparator or analog sampled-data circuit filter).

EE 5361. Computer Architecture and Machine Organization. (3 cr. §CSci 5201. Prereq–2301, 2361)
Introduction to computer architecture. Aspects of computer systems, such as pipelining, memory hierarchy, and input/output systems. Performance metrics. Examination of each component of a complicated computer system.

EE 5371. Computer Systems Performance Measurement and Evaluation. (3 cr. §5863. Prereq–5361 or #)
Tools/techniques for analyzing computer hardware, software, and system performance. Benchmark programs, measurement tools, performance metrics. Deterministic/probabilistic simulation techniques, random number generation/testing. Bottleneck analysis.

EE 5381. Telecommunications Networks. (3 cr. Prereq–[4501, 5531] or #)
Fundamental concepts of modern telecommunications networks, mathematical tools required for their performance analysis. Layered network architecture, point-to-point protocols/links, delay models, multiaccess communication/routing.

EE 5391. Computing With Neural Networks. (3 cr. Prereq–3025 or Stat 3091 or #)
Neural networks as a computational model; connections to AI, statistics and model-based computation; associative memory and matrix computation; Hopfield networks; supervised networks for classification and prediction; unsupervised networks for data reduction; associative recognition and retrieval, optimization, time series prediction and knowledge extraction.

EE 5501. Digital Communication. (3 cr. Prereq–4501, 3025, sr or grad in IT major or #)
Theory and techniques of modern digital communications. Communication limits; modulation and detection; data transmission over channels with intersymbol interferenceimal and suboptimal sequence detection; equalization. Error correction coding; trellis-coded modulation; multiple access.

EE 5505. Wireless Communication. (3 cr. Prereq–4501, [IT grad student or #]; 5501 recommended)
Introduction to wireless communication systems. Propagation modeling, digital communication over fading channels, diversity and spread spectrum techniques, radio mobile cellular systems design, performance evaluation. Current European, North American, and Japanese wireless networks.

EE 5531. Probability and Stochastic Processes. (3 cr. Prereq–3025, grad in IT major or #)
Probability, random variables and random processes. System response to random inputs. Gaussian, Markov and other processes for modeling and engineering applications. Correlation and spectral analysis. Basic estimation principles. Examples from digital communications and computer networks.

EE 5542. Adaptive Digital Signal Processing. (3 cr. Prereq–[4541, 5531] or #)
Design, application, and implementation of optimum/adaptive discrete-time FIR/IIR filters. Wiener, Kalman, and Least-Squares. Linear prediction. Lattice structure. LMS, RLS, and Levinson-Durbin algorithms. Channel equalization, system identification, biomedical/sensor array processing, spectrum estimation. Noise cancellation applications.

EE 5545. Real-Time Digital Signal Processing Laboratory. (2 cr. Prereq–4541)
Lab. Real-time computation of digital signal processing (DSP) functions, including filtering, sample-rate change, and differential pulse code modulation; implementation on a current DSP chip. DSP chip architecture, assembly language, arithmetic; real-time processing issues; processor limitations; I/O handling.

EE 5549. Digital Signal Processing Structures for VLSI. (3 cr. Prereq–4541)
Pipelining; parallel processing; fast convolution; FIR, rank-order, IIR, lattice, adaptive digital filters; scaling and roundoff noise; DCT; Viterbi coders; lossless coders, video compression.

EE 5551. Multiscale and Multirate Signal Processing. (3 cr. Prereq–4541, 5531, grad in IT major or #)
Multirate discrete-time systems. Bases, frames; continuous wavelet transform; scaling equations; discrete wavelet transform; applications in signal and image processing.

EE 5581. Information Theory and Coding. (3 cr. Prereq–5531 or #)
Source and channel models, codes for sources and channels. Entropy, mutual information, capacity, rate-distortion functions. Coding theorems.

EE 5585. Data Compression. (3 cr. Prereq–IT sr or grad or #)
Source coding in digital communications and recording; codes for lossless compression; universal lossless codes; lossless image compression; scalar and vector quantizer design; loss source coding theory; differential coding, trellis codes, transform and subband coding; analysis/synthesis schemes.

EE 5601. Introduction to RF/Microwave Engineering. (3 cr. Prereq–4601, [IT sr or grad])
Fundamentals of EM theory and transmission lines concepts. Transmission lines and network analysis. CAD tool. Lumped circuit component designs. Passive circuit components. Connectivity to central communication theme.

EE 5602. RF/Microwave Circuit Design. (3 cr. Prereq–5601 or equiv)
Transmission lines, network analysis concepts. CAD tools for passive/active designs. Diode based circuit designs (detectors, frequency multipliers, mixers). Transistor based circuit design (amplifiers, oscillators, mixer/doubler).

EE 5611. Plasma-Aided Manufacturing. (4 cr. §ME 5361. Prereq–Grad or upper div IT , ME 3321, ME 3322 or equiv)
Manufacturing using plasma processes; plasma properties as a processing medium; plasma spraying, welding and microelectronics processing; process control and system design; industrial speakers; a cross-disciplinary experience between heat transfer design issues and manufacturing technology.

EE 5613. RF/Microwave Circuit Design Laboratory. (2 cr. Prereq–5601)
Scattering parameters, planar lumped circuits, transmission lines, RF/microwave substrate materials, matching networks/tuning elements, resonators, filters, combiners/dividers, couplers. Integral lab.

EE 5616. Antenna Theory and Design. (3 cr. Prereq–5601 or concurrent registration in 5601)
Antenna performance parameters, vector potential/radiation integral, wire antenna structures, broadband antenna structures, microstrips/aperture theory, antenna measurements.

EE 5621. Physical Optics. (3 cr. Prereq–3015 or #)
Physical optics principles, including Fourier analysis of optical systems and images, scalar diffraction theory, interferometry, and coherence theory. Applications discussed include diffractive optical elements, holography, astronomical imaging, optical information processing, and microoptics.

EE 5622. Physical Optics Laboratory. (1 cr. Prereq–5621 or ¶5621)
Fundamental optical techniques. Diffraction and optical pattern recognition. Spatial and temporal coherence. Interferometry. Speckle. Coherent and incoherent imaging. Coherent image processing. Fiber Optics.

EE 5624. Optical Electronics. (4 cr. Prereq–3601 or Phys 3002 or #)
Fundamentals of lasers, including propagation of Gaussian beams, optical resonators, and theory of laser oscillation. Polarization optics, electro-optic, acousto-optic modulation, nonlinear optics, and phase conjugation.

EE 5627. Optical Fiber Communication. (3 cr. Prereq–3015, 3601 or #)
Components and systems aspects of optical fiber communication. Modes of optical fibers. Signal degradation and dispersion. Optical sources and detectors. Digital and analog transmissions systems. Direct detection and coherent detection. Optical amplifiers. Optical soliton propagation.

EE 5629. Optical System Design. (2 cr. Prereq–IT sr or grad)
Elementary or paraxial optics. Non-paraxial, exact ray tracing. Energy considerations in instrument design. Fourier optics and image quality. Design examples: telescopes, microscopes, diffraction-limited lenses, projectors, and scientific instruments.

EE 5632. Photonic Communication Devices and Systems. (3 cr. Prereq–5163 or 5624 or equiv or #)
Primary solid-state components using optical communication systems. Semiconductor lasers, detectors, and optical fibers. Basic optoelectronic properties of III-V semiconductors: band structure, optical transitions, heterostructures. LEDs, semiconductor lasers, detectors. Optical network components/systems: fibers, amplifiers, power, system architectures.

EE 5653. Physical Principles of Magnetic Materials. (3 cr. Prereq–IT grad or #)
Physics of diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, ferrimagnetism; ferromagnetic phenomena; static and dynamic theory of micromagnetics, magneto-optics, and magnetization dynamics; magnetic material applications.

EE 5655. Magnetic Recording. (3 cr. Prereq–IT grad or #)
Magnetic fundamentals, recording materials, idealized models of magnetic records/reproduction, analytic models of magnetic record heads, sinusoidal magnetic recording, digital magnetic recording, magnetic recording heads/media, digital recording systems.

EE 5657. Physical Principles of Thin Film Technology. (4 cr. Prereq–IT sr or grad student or #)
Physical principles of deposition, characterization, and processing of thin film materials. Materials science, vacuum science, and technology. Physical vapor deposition techniques. Properties of thin films and metallurgical/protective coatings. Modification of surface films. Emerging thin film materials/applications. Lab. Demonstration experiments.

EE 5705. Advanced Electric Drives. (3 cr. Prereq–4701)
D-q axis analysis of salient-pole synchronous motor drives; vector-controlled induction motor drives, sensor-less drives, voltage space-vector modulation techniques, current-source inverter drives, reluctance drives; power quality issues. Integrated software lab.

EE 5721. Power Generation Operation and Control. (3 cr. Prereq–4721)
Engineering aspects of power system operation; economic analysis of generation plants and scheduling to minimize total cost of operation; scheduling of hydro resources and thermal plants with limited fuel supplies; loss analysis and secure operation; state estimation and optimal power flow; power system organizations.

EE 5725. Power Systems Engineering. (3 cr. Prereq–4721)
Reliability analysis of large power generation and transmission systems; writing programs for state-by-state analysis and Monte Carlo analysis; power system protection systems, circuit current calculations, short circuit detection, isolating faulted components; characteristics of protection components.

EE 5741. Advanced Power Electronics. (3 cr. Prereq–4741)
Physics of solid-state power devices, passive components, magnetic optimization, advanced topologies. Unity power factor correction circuits, EMI issues, snubbers, soft switching in dc/ac converters. Practical considerations. Very low voltage output converters. Integrated computer simulations.

EE 5811. Biomedical Instrumentation. (3 cr. Prereq–IT sr or life-science sr or grad student)
Biological signal sources. Electrodes, microelectrodes, other transducers. Characteristics of amplifiers. Noise in biological signals. Filtering, recording, display. Protection of patients from electrical hazards. Experiments in neural/muscle stimulation, EKG/EMG recording, neuron simulation, filtering, and low-noise amplifiers.

EE 5821. Biological System Modeling and Analysis. (3 cr. Prereq–IT sr or life science sr or grad)
Purpose of biological system modeling; advantages, limitations, special problems. Models of nerve excitation and propagation. Biological control systems; respiratory and cardiovascular systems. Sensory organs and theories of perception. Limbs and locomotion.

EE 5863. Computer Systems Performance Analysis. (2 cr. §5371. Prereq–5361 or #)
Basic performance measurement/simulation techniques necessary for experimental computer science/engineering. Hands-on performance evaluation techniques using simulations/ measurements of existing systems. Using measured data to compare computer systems or to judge how much a new architectural feature improves systems performance.

EE 5940. Special Topics in Electrical Engineering I. (1-4 cr. Prereq–#)
Special topics in electrical and computer engineering. Topics vary.

EE 5950. Special Topics in Electrical Engineering II. (1-4 cr. Prereq–#)
Special topics in electrical and computer engineering. Topics vary.

EE 5960. Special Topics in Electrical Engineering III. (1-4 cr. Prereq–#)
Special topics in electrical and computer engineering. Topics vary.

EE 5990. Curricular Practical Training. (1 cr [max 2 cr]; S-N only. Prereq–#)
Industrial work assignment involving advanced electrical engineering technology. Review by faculty member. Final report covering work assignment.

Emergency Health Services (EHS)

College of Continuing Education

EHS 4011. Concepts of Emergency Health Services. (3 cr; A-F only)
Emergency medical system (EMS). Its impact on all aspects of U.S. culture. Basic practices generalized across systems. Comprehensive review of components required for effective EMS. Historical perspective, medical-legal concerns, medical oversight, accountability, scope of practice, communications/transportation, rural vs. urban issues, disaster management.

EHS 4021. EMS Planning and Fiscal Management. (3 cr; A-F only)
Fundamentals of planning, fiscal, and process management as related to emergency medical systems (EMS). Regulatory requirements, EMS delivery models, contract negotiations, budgeting, scenario planning.

EHS 4112. First Responder for Coaches and Athletic Trainers. (3 cr; A-F only)
Critical thinking skills in emergency settings. Patient assessment, airway management, CPR, splinting, spinal immobilization. Certifications: AHA-BLS, First Responder.

EHS 4999. Practicum. (3 cr; A-F only. Prereq–EHS)
Project in student's employing organization or project in organization providing internship or integration of projects from previous coursework or development of program-related project.

EHS 5031. Basic Principles of Research. (3 cr; A-F only)
Basic principles of research in emergency health services.

English as a Second Language (ESL)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

ESL 0010. TOEFL Preparation. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Describes the format of the TOEFL test. Focuses on strategies for improving skills for each section of the test.

ESL 0020. Pronunciation Workshop. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Individual attention to specific areas of spoken language, including intonation, rhythm, segmentals.

ESL 0040. Skills Enhancement. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Student will focus on specific areas of their English which need improvement.

ESL 0080. English Through Literature. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
An advanced course designed for students who want further practice in reading, listening, speaking and writing for non-academic purposes.

ESL 0090. English Through Music. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Student will learn English vocabulary and culture through folksongs and by looking at popular music in various decades.

ESL 0100. Topics in American Culture. (0 cr [max 6 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Students will learn about areas of U.S. culture such as American humor, religions, ethnic groups, lifestyles, and popular culture.

ESL 0111. Beginning Grammar. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Introduces and reviews grammatical structures with attention to meaning, use, and form.

ESL 0121. Beginning Reading/Composition. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Reading short passages of limited difficulty. Emphasizes main ideas, vocabulary, reading speed, skimming and scanning. Writing fundamentals, spelling, punctuation, paragraphing, and basic organization. Writing exercises and free writing.

ESL 0131. Beginning Oral Skills. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Focuses on the ability to communicate in English in everyday situations. Listening and speaking are emphasized.

ESL 0181. Beginning Integrated English. (0 cr [max 18 cr]; S-N only. Prereq–Nonnative English Speaker, Δ; see Minnesota English Center for override)
Reading, writing, speaking, listening, grammar.

ESL 0191. Beginning Skills Enhancement. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English Speaker, Δ; see Minnesota English Center for override)
Improving basic English language skills through work in computer/language lab. Focused activities for individual learners.

ESL 0193. Pronunciation. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Addresses important aspects of English pronunciation necessary to improve comprehensibility and reduce foreign-accents. Includes work on enunciation; word, phrasal, and sentence stress; intonation; linking; thought groups; and rhythm.

ESL 0200. Understanding American Universities. (0 cr [max 2 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Strategies for success in academic classes including vocabulary development, lecture comprehension, and textbook reading; application of listening skills and the reading of supporting unadapted material.

ESL 0211. High Beginning Grammar. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Reviews and adds to students' skills with basic structures. Focuses on increasingly complex structures with attention to form, meaning, and use; practice of structures in controlled speaking and writing activities.

ESL 0221. High Beginning Reading/Composition. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Reading longer passages of limited difficulty with increased speed. Main ideas, vocabulary development, reading speed, skimming and scanning. Writing fundamentals, spelling, punctuation, paragraphing, and organization. Writing exercises and free writing.

ESL 0231. High Beginning Oral Skills. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Ability to communicate in English in everyday situations. Emphasis on listening and speaking, and increasing vocabulary and fluency in spoken English.

ESL 0300. Computer Lab: Intro to Computer Basics. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Students will learn basic word processing.

ESL 0310. Computer Lab: Using the Internet for Language Learning. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Students will complete projects on e-mail and the Internet.

ESL 0311. Low Intermediate Grammar. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Reviews and adds to students' skills with basic structures. Emphasizes increasingly complex structures with attention to form, meaning, and use; practice of structures used in controlled speaking and writing situations.

ESL 0321. Low Intermediate Reading/Composition. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Reading for main ideas and supporting ideas with increased speed; vocabulary development, word formation, and use of dictionary; spelling, punctuation and paragraphing. Organization and writing as a process.

ESL 0331. Low Intermediate Oral Skills. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Practice in speaking in structured and semi-structured situations with special attention to basic regularities in pronunciation.

ESL 0400. Library and Research Skills. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Students will learn the basics of using the university library system for research purposes.

ESL 0411. Intermediate Grammar. (0 cr [max 8 cr]; S-N only. Prereq–Non-native speaker of English; see Minnesota English Center for override.)
Reviews and adds to students' skills with basic structures. Increasingly complex structures with attention to form, meaning and use. Verb phrases; practice of structures in controlled speaking and writing activities.

ESL 0421. Intermediate Reading/Composition. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker. See Minnesota English Center for override.)
Reading for main ideas and supporting ideas with increased speed; vocabulary development through study of word formation and use of dictionary. Writing fundamentals; organization and writing as a process.

ESL 0431. Intermediate Oral Skills. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Develop fluency and accuracy; language for specific functions; communication strategies; standard forms of organization for academic lectures; understanding natural conversational speech.

ESL 0500. Community Service Learning. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Students will learn about and participate in community service projects.

ESL 0511. High Intermediate Grammar. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Reviews and adds to repertoire of structures with attention to meaning, use and form; emphasizes verb phrase and control of grammar in writing.

ESL 0521. High Intermediate Reading/Composition. (0 cr [max 16 cr]; S-N only)
Reading unadapted as well as adapted passages; efficiency, vocabulary, drawing inferences, identifying point of view, using knowledge of organization to aid understanding, writing process, academic-style assignments.

ESL 0531. High Intermediate Oral Skills. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Develop fluency and accuracy in everyday situations and in academic situations; special attention to communication strategies; prepares students for academic lectures by introducing standard forms of organization and note-taking skills. Students also work on understanding natural conversational speech using a variety of authentic materials.

ESL 0600. International Business Communication. (0 cr [max 4 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
How to write business letters in English. E-mail, voice mail for business.

ESL 0611. Advanced Grammar. (0 cr [max 4 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Focuses on difficult areas of grammar and on providing students with resources to work on them. Meaning, use and form are emphasized with increased emphasis on complex sentence patterns.

ESL 0621. Advanced Reading Composition: The Written Word. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Focuses on improving reading efficiency, including strategy development, as well as vocabulary skill building. Some focus on using reading to support academic writing.

ESL 0622. Advanced Reading/Composition: The Written Word. (0 cr [max 16 cr]; S-N only. Prereq–0621)
Continuation of ESL 0621.

ESL 0631. Advanced Oral Skills. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative English speaker, override from Minnesota English Center)
Listening/speaking skills, U.S. culture. Presentations, readings, film, discussion, travel. Meets for 20 hours weekly. Ten-day camping trip through sites of cultural/historical significance in Minnesota and South Dakota.

ESL 0641. Advanced Listening Comprehension. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Lecture comprehension with attention to note taking, recognizing main ideas and support, and determining the attitude of the speaker toward the subject; comprehension of complex information presented in a nonlecture format, as in television documentaries.

ESL 0651. Advanced Speaking/Pronunciation. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Emphasizes the use of spoken English in academic settings as well as in conversation. Pronunciation focuses on individual needs.

ESL 0661. Advanced Reading. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Students will work on comprehending authentic texts of significant lengths. Develop strategies to apply in academic reading.

ESL 0671. Advanced Composition. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Skills needed at every stage of the writing process: finding a topic, determining an approach to the topic, planning and drafting a composition, revising, and editing. Suiting one's writing to audience and topic, and looking at one's own writing critically.

ESL 0700. Topics in the Media. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
News media as means of English improvement and as source of information/entertainment. Major international news events via radio broadcasts, newspaper, and other news sources. Understanding American culture and developing listening/speaking skills using American movies/television.

ESL 0711. Grammar Through Writing. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override.)
Focuses on production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0712. Grammar Through Writing. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
Production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0713. Grammar Through Writing. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
Production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0721. High Advanced Reading/Composition. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override.)
Emphasizes reading for academic purposes. Focus on comprehension of scholarly reading selections and on increasing reading efficiency. Focus on writing process, academic-style assignments.

ESL 0731. High Advanced Oral Skills. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
Emphasizes listening and speaking skills in addition to understanding of U.S. culture through interaction with American students. Attend a weekly seminar with American university students and visit local schools to make presentations about your home country. Pronunciation instruction will focus on individual needs.

ESL 0732. High Advanced Oral Skills. (0 cr [max 16 cr]; S-N only. Prereq–0731)
Continuation of 0731

ESL 0741. High Advanced Listening Comprehension. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
Lecture comprehension with special attention to note taking, recognizing main ideas and support, and understanding relationship of ideas, implied information, and structure of speech; comprehension of information presented in a wide variety of authentic materials.

ESL 0751. High Advanced Speaking/Pronunciation. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative English speaker; see Minnesota English Center for override)
Emphasizes use of spoken English in academic settings, including presentation skills and discussion skills; pronunciation focuses on individual needs of students.

ESL 0761. High Advanced Reading. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
Continued development of strategies to increase reading efficiency and comprehension; paraphrasing/summarizing text; quoting and citing sources; understanding writer's perspective.

ESL 0771. High Advanced Composition. (0 cr [max 8 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
Refining of skills needed in the writing process; refinement of use of complex grammatical structures; research to support writing.

ESL 0800. English for Science and Technology. (0 cr [max 2 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
English for formulating hypotheses, describing experiments, and presenting results; includes reading, writing, listening, and speaking activities based on scientific and technical English.

ESL 0810. SIELOP: Grammar. (0 cr; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
Form, function, meaning of English grammar.

ESL 0820. SIELOP: Reading. (0 cr [max 3 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
English language reading skills.

ESL 0830. SIELOP: Composition. (0 cr; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
English writing skills.

ESL 0840. SIELOP: Speaking/Pronunciation. (0 cr [max 3 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
English speaking, pronunciation skills

ESL 0850. SIELOP: Listening. (0 cr; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
English listening skills.

ESL 0911. Fundamentals in English as a Second Language. (0 cr [max 12 cr]; S-N only. Prereq–Δ, satisfactory score on [EPT or MNBatt or TOEFL])
Basic knowledge/skills needed for daily communication in spoken English. Grammatical structures explained with reference to their uses in social situations. Pronunciation.

ESL 0912. Fundamentals in English as a Second Language. (0 cr [max 12 cr]; S-N only. Prereq–Dept consent, satisfactory score on [EPT or MNBatt or TOEFL])
Basic knowledge/skills needed for daily communication in spoken English. Grammatical structures explained with reference to their uses in social situations. Pronunciation.

ESL 0931. Developing Fluency in English as a Second Language. (0 cr [max 12 cr]; S-N only. Prereq–Dept consent, satisfactory score on [EPT or MNBatt or TOEFL])
Communication skills for social, academic, and professional purposes. Emphasizes listening/speaking. Content drawn from mass media.

ESL 0932. Developing Fluency in English as a Second Language. (0 cr [max 12 cr]; S-N only. Prereq–Δ, satisfactory score on [EPT or MNBatt or TOEFL])
Communication skills for social, academic, and professional purposes. Emphasizes listening/speaking. Content drawn from mass media.

ESL 0933. Developing Fluency in English as a Second Language. (0 cr [max 6 cr]; S-N only. Prereq–Satisfactory score on [EPT or MNBatt or TOEFL])
Communication skills for social, academic, and professional purposes. Emphasizes listening/speaking. Content drawn from mass media.

ESL 0937. International Business Communication. (0 cr [max 16 cr]; S-N only. Prereq–Nonnative speaker of English; see Minnesota English Center for override)
Oral communication in a business setting. English as used in international trade, finance, and marketing. Listening/speaking skills for business materials. E-mail, voice mail. Writing business letters.

ESL 0971. Advanced Academic Writing. (0 cr [max 8 cr]; S-N only. Prereq–Δ, grad student, non-native speaker of English, satisfactory score on [EPT or MNBatt or TOEFL])
Introduction to the use of library system and to types of writing required in graduate school courses. Developing/organizing ideas, drafting, revising/editing papers, writing essay exams.

English: Creative and Professional Writing (EngW)

Department of English Language and Literature

College of Liberal Arts

EngW 1101W. Introduction to Creative Writing. (4 cr)
Writing poetry and prose. Small group workshops and lecture presentations by visiting writers. For those who want to try creative writing, improve reading skills, and learn more about the creative process.

EngW 1102. Introduction to Fiction Writing. (3 cr)
Beginning instruction in the art of fiction: characterization, plot, dialogue, and style. Writing exercises to help students generate ideas. Students read and discuss published fiction as well as their own writing.

EngW 1103. Introduction to Poetry Writing. (3 cr)
Beginning instruction in the art of poetry. Discussion of student poems and contemporary poetry, ideas for generating material, and writing exercises both in and out of class.

EngW 1104. Introduction to Literary Nonfiction Writing. (3 cr)
Beginning instruction in the art of literary nonfiction, including the memoir. Discussion of student work and contemporary creative nonfiction, ideas for generating material, and writing exercises.

EngW 3101. Intermediate Creative Writing. (3 cr. Prereq–1101 or Δ)
For students with experience in creative writing. Exercises, experiments, assigned readings, and discussion of students' work.

EngW 3102. Intermediate Fiction Writing. (3 cr. Prereq–1101 or 1102 or Δ)
Exercises, experiments, assigned readings, discussion of student work.

EngW 3103. Advanced Fiction Writing. (4 cr. Prereq–3102 or Δ)
Advanced workshop.

EngW 3104. Intermediate Poetry Writing. (3 cr. Prereq–1101 or 1103 or Δ)
Exercises, experiments, assigned readings, discussion of student work.

EngW 3105. Advanced Poetry Writing. (4 cr. Prereq–3104 or Δ)
Opportunity to explore new poetic possibilities and read widely in contemporary poetry/poetics. Advanced workshop.

EngW 3106. Intermediate Literary Nonfiction Writing. (3 cr. Prereq–1104 or Δ)
Exercises, experiments, assigned readings, and discussion of students' work.

EngW 3107. Advanced Nonfiction Writing. (4 cr. Prereq–3106 or Δ)
Advanced workshop.

EngW 3110. Topics in Creative Writing. (3 cr [max 9 cr]. Prereq–1101 or 1102 or 1103 or 1104 or Δ)
Topics specified in *Class Schedule.*

EngW 3110H. Topics in Creative Writing. (3 cr [max 9 cr]. Prereq–[1101 or 1102 or 1103 or 1104], honors)
Topics specified in *Class Schedule.*

EngW 3960. Writing Workshop for Majors. (4 cr; A-F only. Prereq–Engl major, 6 cr of EngW [including EngW 3xxx appropriate for workshop genre], [jr or sr], major adviser approval, Δ)
Topics specified in *Class Schedule.*

EngW 3960W. Writing Workshop for Majors. (4 cr; A-F only. Prereq–Engl major, 6 cr of EngW [including EngW 3xxx], [jr or sr], major adviser approval, writing portfolio, Δ)
Topics specified in *Class Schedule.*

EngW 5102. Advanced Fiction Writing. (4 cr [max 8 cr]. Prereq–Δ)
Advanced workshop for graduate students with considerable experience in writing fiction.

EngW 5103. Advanced Fiction Writing. (4 cr [max 8 cr]. Prereq–Δ)
Advanced workshop for students with considerable experience in writing fiction.

EngW 5104. Advanced Poetry Writing. (4 cr [max 8 cr]. Prereq–Δ)
Advanced workshop for graduate students with considerable experience in writing poetry. An opportunity to explore new poetic possibilities and to read widely in contemporary poetry and poetics.

EngW 5105. Advanced Poetry Writing. (4 cr [max 8 cr]. Prereq–Δ)
Advanced workshop for students with considerable experience in writing poetry. An opportunity to explore new poetic possibilities and to read widely in contemporary poetry and poetics.

EngW 5106. Advanced Literary Nonfiction Writing. (4 cr [max 8 cr]. Prereq–Δ)
Advanced workshop for graduate students with considerable experience in writing literary nonfiction.

EngW 5107. Advanced Nonfiction Writing. (4 cr [max 16 cr]. Prereq–Δ)
Advanced workshop for students with considerable experience in writing literary nonfiction.

EngW 5110. Topics in Advanced Fiction Writing. (4 cr [max 16 cr]. Prereq–Δ)
Special topics in fiction writing. Topics specified in *Class Schedule.*

EngW 5120. Topics in Advanced Poetry. (4 cr [max 16 cr]. Prereq–Δ)
Special topics in poetry writing. Topics specified in *Class Schedule.*

EngW 5130. Topics in Advanced Creative Writing. (4 cr [max 16 cr]. Prereq–#)
Workshop. Might include work in more than one genre.

EngW 5201. Journal and Memoir Writing. (3 cr)
Using memory in writing, from brainstorming to drafting to revising, in several genres (poems, traditional memoir essays, fiction). How diverse cultures shape memory differently.

EngW 5202. Journal and Memoir Writing. (3 cr)
Using memory in writing, from brainstorming to drafting to revision, in several genres (poems, traditional memoir essays, fiction). How diverse cultures shape memory differently.

EngW 5204. Playwriting. (4 cr [max 8 cr]. Prereq–Δ)
Advanced workshop. Contact creative writing program for specific description.

EngW 5205. Screenwriting. (4 cr. Prereq–Δ)
Advanced workshop. Contact creative writing program for specific description.

EngW 5210. Topics in Advanced Literary Nonfiction. (4 cr [max 16 cr]. Prereq–Δ)
Special topics in essay writing (e.g., arts reviewing, writing about public affairs, writing in personal voice). Topics specified in *Class Schedule.*

EngW 5310. Reading as Writers. (4 cr [max 8 cr]. Prereq–Grad student, Δ)
Special topics in reading fiction, literary nonfiction, poetry. Topics specified in *Class Schedule.*

EngW 5501. Minnesota Writing Project Selective Institute. (1-3 cr [max 3 cr]. Prereq–Competitive selection for 20 educators [K-college])
Emphasizes participants' teaching each other best practices in writing instruction. Participants attend a retreat before beginning.

EngW 5502. Minnesota Writing Project Open Institute. (2 cr. Prereq–Teacher (K-college), [school district sponsorship or MWP approval])
Summer workshop to refine skills in writing instruction.

EngW 5570. Minnesota Writing Project Directed Studies. (1-3 cr [max 3 cr]; A-F only)
Current theories of writing and writing pedagogy. Topics vary. Workshop.

EngW 5606. Literary Aspects of Journalism. (3 cr; A-F only. §Jour 5606)
Literary aspects of journalism as exemplified in and influenced by works of English/American writers past/present. Lectures, discussions, weekly papers.

EngW 5993. Directed Study in Writing. (1-4 cr [max 18 cr]. Prereq–#, Δ, ❑)
Projects in writing poetry, fiction, drama, and nonfiction, or study of ways to improve writing.

English: Literature (EngL)

Department of English Language and Literature

College of Liberal Arts

EngL 1001V. Honors: Introduction to Literature: Poetry, Drama, Narrative. (4 cr; A-F only. §1001. Prereq–Honors)
Basic techniques for analyzing/understanding literature. Readings of novels, short stories, poems, plays.

EngL 1001W. Introduction to Literature: Poetry, Drama, Narrative. (4 cr. §1002. Prereq–[EngC 1011 or equiv])
Basic techniques for analyzing/understanding literature. Readings of novels, short stories, poems, plays.

EngL 1181V. Honors: Introduction to Shakespeare. (4 cr; A-F only. §1181. Prereq–Honors)
Survey of Shakespeare's work, treating approximately 10 plays. Lecture.

EngL 1181W. Introduction to Shakespeare. (4 cr. §1182)
Survey of Shakespeare's work, treating approximately 10 plays. Lecture.

EngL 1201V. Honors: Introduction to American Literature. (4 cr; A-F only. §1201. Prereq–Honors)
Chronologically/thematically based readings from American literature. Approaches to literary analysis/criticism. Social/historical contexts of authorship/reading, literary artistry/conventions. Discussion, writing.

EngL 1201W. Introduction to American Literature. (4 cr. §1202)
Chronologically/thematically based readings from American literature. Approaches to literary analysis/criticism. Social/historical contexts of authorship/reading, literary artistry/conventions. Discussion, writing.

EngL 1301V. Honors: Introduction to Multicultural American Literature. (4 cr; A-F only. §1301. Prereq–Honors)
Representative works by African American, American Indian, Asian American, and Chicano/Chicana writers, chiefly from twentieth century. Social/cultural factors in America's literary past/present.

EngL 1301W. Introduction to Multicultural American Literature. (4 cr. §1302)
Representative works by African American, American Indian, Asian American, and Chicano/Chicana writers, chiefly from 20th century. Social/cultural factors informing America's literary past/present.

EngL 1401V. Honors: Introduction to World Literatures in English. (4 cr; A-F only. §1401. Prereq–Honors)
Introduction to diverse work produced in English outside the United States and Britain. Works represent different cultures, but treat concerns derived from a common post-colonial legacy.

EngL 1401W. Introduction to World Literatures in English. (4 cr. §1402)
Diverse works produced in English outside the United States and Britain. Works represent different cultures, but treat concerns derived from common post-colonial legacy.

EngL 1501. Literature of Public Life. (4 cr; A-F only)
Meaning/practice of citizenship. Historical themes, contemporary issues in American public life: access of citizenship, tensions between social duties and individual freedoms, role of moral values in public life. Diverse literary materials.

EngL 1601W. English Language and Society. (4 cr)
Nontechnical understanding of systematic, dynamic, creative nature of human language. Emphasizes English language.

EngL 1701. Modern Fiction. (4 cr)
Basic techniques for analyzing/understanding fiction. Readings from novels and short stories written in English-speaking countries and elsewhere (in translation). Introduction to fictional techniques such as point of view, fictional conventions, and some forms of experimentation.

EngL 1905. Topics: Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule.*

EngL 1910W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule.*

EngL 3001V. Honors: Textual Interpretation, Analysis, and Investigation. (4 cr; A-F only. §3001. Prereq–Honors)
Training/practice in analyzing various literary forms. Emphasizes poetry. Argument, evidence, and documentation in literary papers. Introduction to major developments in contemporary criticism.

EngL 3001W. Textual Interpretation, Analysis, and Investigation. (4 cr. §3001V, §3801)
Training/practice in analysis of various literary forms. Emphasizes poetry. Use of argument, evidence, and documentation in literary papers. Introduction to major developments in contemporary criticism.

EngL 3002. Modern Literary Criticism and Theory. (3 cr. §3802. Prereq–[3001, 12 cr in other literature courses] or #)
Problems of interpretation/criticism. Questions of meaning, form, authority, literary history, social significance.

EngL 3002H. Honors: Modern Literary Criticism and Theory. (3 cr. §3002. Prereq–CLA honors)
Problems of interpretation/criticism. Questions of meaning, form, authority, literary history, social significance.

EngL 3003W. Historical Survey of British Literatures I. (4 cr)
An introductory historical survey of British literature and culture from the Anglo-Saxon invasions through the end of the 18th century.

EngL 3004W. Historical Survey of British Literatures II. (4 cr)
An introductory historical survey of British literature and culture in the 19th and 20th centuries. Includes Romantic, Victorian, and Modernist authors, such as Wordsworth, Keats, Tennyson, the Brontës, Austen, Dickens, Wilde, Yeats, Woolf, and Thomas.

EngL 3005W. Survey of American Literatures and Cultures I. (4 cr)
Readings in American literature from first European contact through colonial times, and to the mid-19th century. Readings in several genres will include world-famous classics as well as the work of people of color and women. Attention to historical contexts.

EngL 3006W. Survey of American Literatures and Cultures II. (4 cr)
Readings from the mid-19th to the mid-20th century; including the realists' and regionalists' response to the growth of industrial capitalism, Modernism in the 1920s, and the issues which united and divided the country throughout the 20th century.

EngL 3007. Shakespeare. (3 cr. §3807)
Plays from all of Shakespeare's periods, including at least *A Midsummer Night's Dream*, *Hamlet*, the history plays, *King Lear, Macbeth, The Tempest, Twelfth Night, Antony and Cleopatra, Othello*, and *The Winter's Tale*.

EngL 3007H. Honors: Shakespeare. (3 cr. §3007. Prereq–CLA honors)
Plays from all of Shakespeare's periods, including at least *A Midsummer Night's Dream*, *Hamlet*, the history plays, *King Lear, Macbeth, The Tempest, Twelfth Night, Antony and Cleopatra, Othello*, and *The Winter's Tale*.

EngL 3010. Studies In Poetry. (3 cr [max 9 cr])
Special topics related to reading poetry in various interpretive contexts.

EngL 3010H. Studies In Poetry. (3 cr [max 9 cr]. Prereq–Honors)
Special topics related to reading poetry in various interpretive contexts.

EngL 3020. Studies in Narrative. (1-4 cr [max 9 cr])
Examine issues related to reading and understanding narrative in a variety of interpretive contexts. Topics may include "The 19th-century English (American, Anglophone) Novel," "Introduction to Narrative," or "Techniques of the Novel." Topics specified in the *Class Schedule.*

EngL 3020H. Honors: Studies In Narrative. (3 cr; A-F only. §3020. Prereq–Honors)
Issues related to reading/understanding narrative in various interpretive contexts. Topics may include nineteenth-century English (American, Anglophone) novel; narrative; or techniques of the novel. Topics specified in *Class Schedule.*

EngL 3030. Studies in Drama. (3 cr [max 9 cr])
Topics may include English Renaissance tragedy, English Restoration and 18th century, or American drama by writers of color; single-author courses focused on writers such as Tennessee Williams and Eugene O'Neill, or issues and themes, such as gender and performance.

EngL 3030H. Studies in Drama. (3 cr [max 9 cr]. Prereq–Honors)
Topics may include English Renaissance tragedy; English Restoration and 18th century; American drama by writers of color; single-author courses focused on writers such as Tennessee Williams and Eugene O'Neill; issues/themes such as gender and performance.

EngL 3040. Studies in Film. (2-3 cr [max 9 cr])
Topics regarding film in a variety of interpretive contexts, from the range and historic development of American, English and Anglophone film. Recent examples: "American Film Genres," "Film Noir," "Chaplin and Hitchcock." Topics and viewing times announced in *Class Schedule.*

EngL 3060. Studies in Literature and the Other Arts. (3 cr [max 9 cr])
Examines literature's role in conjunction with other arts including music, the visual arts, dance, etc. Topics specified in *Class Schedule.*

EngL 3070. Studies in Literary and Cultural Modes. (3 cr [max 9 cr])
Modes of literary expression and representation that transcend conventional demarcations of genre and historical periods. Topics may include horror, romance, mystery, comedy, and satire.

EngL 3110. Medieval Literatures and Cultures. (3 cr [max 9 cr])
Major and representative works of the Middle Ages. Topics specified in the *Class Schedule.*

EngL 3111. Survey of English Literature I, Transition. (3 cr; A-F only)
Historical survey of major figures, movements, and trends in English literature. Chaucer to Marvell, including Spenser, Shakespeare, and Donne.

EngL 3112. Survey of English Literature II, Transition. (3 cr; A-F only)
Historical survey of major figures, movements, and trends in English literature. Milton to Johnson, including Dryden, Swift, and Pope.

EngL 3113. Survey of English Literature III, Transition. (3 cr; A-F only)
Historical survey of major figures, movements, and trends in English literature. Blake to Yeats, including Wordsworth, Coleridge, Keats, Tennyson, and the Brownings.

EngL 3131. Advanced Shakespeare. (3 cr. Prereq–3007 or #)
Intensive study of two to four plays, exploration of less familiar plays or of other works including the Sonnets, performance as interpretation with comparative analysis of multiple performances of a play or plays, critical study of multiple-text plays.

EngL 3132. Early Modern Literatures and Cultures I. (3 cr)
Major and representative works of the Renaissance (1485-1660). Typical authors: More, Sidney, Spenser, Donne, Milton.

EngL 3132H. Honors: Early Modern Literatures and Cultures I. (3 cr. §3132. Prereq–Honors or #)
Major and representative works of the Renaissance (1485-1660). Typical authors: More, Sidney, Spenser, Donne, Milton.

EngL 3133. Early Modern Literatures and Cultures II. (3 cr)
Major and representative works of the Restoration and 18th century (1660-1798). Typical authors: Dryden, Pope, Swift, Johnson, Boswell, Fielding.

EngL 3151. Romantic Literatures and Cultures. (3 cr)
British literature written between 1780 and 1830. Examine the concept of Romanticism, the effects of the French Revolution on literary production, and the role of the romantic artist.

EngL 3161. Victorian Literatures and Cultures. (3 cr)
The literature of the British Victorian period (1832-1901) in relation to its cultural and historical contexts. Typical authors include Tennyson, the Brownings, Dickens, Arnold, Hopkins, and the Brontes.

EngL 3161H. Victorian Literatures and Cultures. (3 cr)
The literature of the British Victorian period (1832-1901) in relation to its cultural and historical contexts. Typical authors include Tennyson, the Brownings, Dickens, Arnold, Hopkins, and the Brontës.

EngL 3171. Modern British Literatures and Cultures. (3 cr)
Survey of principal writers, intellectual currents, conventions, genres and themes in Britain from 1950 to the present. Typically included are Beckett, Golding, Kingsley and Martin Amis, Murdoch, Larkin, Hughes, Heaney, Lessing, Shaffer, Stoppard, Fowles, and Drabble.

EngL 3180. Contemporary Literatures and Cultures. (3 cr)
Examine issues related to the reading and understanding of British, American, and Anglophone fiction and poetry in a variety of interpretive contexts.

EngL 3211. American Poetry to 1900. (3 cr)
Poets from the Puritans to the end of the 19th century. The course attends to the intellectual and cultural background of the poets, poetic theory, and form.

EngL 3212. American Poetry from 1900. (3 cr)
Famous and lesser-known poems from the Modernist era, the time of Frost, HD, Pound, Eliot and the Harlem Renaissance. The course attends to the intellectual and cultural background of the poets, poetic theory and form.

EngL 3221. American Novel to 1900. (3 cr)
Novels from the early Republic through Poe, Hawthorne, Melville, and Stowe, to the writers of the end of the 19th century (e.g., Howells, Twain, James, Chopin and Crane). The development of a national literature, tension between realism and romance, and changing role of women as writers and as fictional characters.

EngL 3222. American Novel From 1900. (3 cr)
Novels from early 1900's realism through the Modernists (e.g., Faulkner, Hemingway, Fitzgerald) to more recent writers (e.g., Ellison, Bellow, Erdrich, Pynchon). Stylistic experiments, emergence of voices from formerly under-represented groups, and novelists' responses to a technologically changing society.

EngL 3231. American Drama. (3 cr)
Representative dramas from the 18th through 20th centuries. Topics include the staging of national identities, the aesthetics of modern and contemporary drama, and the production concerns of mainstream, regional, and community theaters.

EngL 3300. Topics in Multicultural American Literatures. (3 cr [max 9 cr])
The writings of specific ethnic groups with an emphasis on historical or cultural context. Topics may include American minority drama, the Harlem Renaissance, Asian-American literature and film, African-American women writers. Topics specified in *Class Schedule*.

EngL 3330. Gay, Lesbian, Bisexual, and Transgender Literature. (3 cr [max 9 cr])
Explore literature and culture produced by and about gay, lesbian, bisexual, and transgendered people. Emphasis on the importance of examining materials usually falsified or ignored in earlier literary and cultural studies and how traditional accounts need to be revised in light of significant contributions of GLBT people to literature and culture.

EngL 3350. Women Writers. (3 cr [max 9 cr])
Groups of writers in the 19th and/or 20th centuries. Will focus either on writers from a single country or be comparative in nature. The course will be organized thematically or according to topics of contemporary and theoretical interest.

EngL 3350H. Honors: Women Writers. (3 cr. §3350. Prereq–CLA honors or Δ)
Groups of writers in 19th or 20th century. Either focuses on writers from a single country or is comparative. Organized thematically or according to topics of contemporary/theoretical interest.

EngL 3400. Post-Colonial Literatures. (3 cr [max 9 cr])
Varied topics in post-Colonial literatures. Typical novelists include Chinua Achebe, Tsitsi Dangaremba, Fadia Faqir, Salman Rushdie; filmmaker Kidlat Tahimik; and "dub" poets Mutabaruka and Jean Binta Breeze.

EngL 3501. Public Discourse: Reading Between and Beyond the Lines. (3 cr)
Public discourse in various geographic regions and historical periods. See *Course Guide* for specific course description.

EngL 3581. Folklore. (3 cr)
Folklore genres such as proverbs, prose narratives (tales and legends), foodways, and games. Outline of the history of folklore.

EngL 3591. Introduction to African American Literature. (3 cr)
Afro-American autobiography, fiction, essay, poetry, drama, and folklore from the late 18th century to the present.

EngL 3591W. Introduction to African American Literature. (3 cr)
Afro-American autobiography, fiction, essay, poetry, drama, and folklore from the late 18th century to the present.

EngL 3592. Introduction to Black Women Writers in the United States. (3 cr)
Literature of African American women writers explored in novels, short stories, essays, poetry, autobiographies, drama from 18th to late-20th century.

EngL 3601W. Analysis of English Language and Culture. (4 cr. §EngC 3601W)
Introduction to structure of English. Phonetics, phonology, morphology, syntax, semantics. pragmatics. Language variation/usage.

EngL 3602. Gender and the English Language. (4 cr)
Connections between gender and other social factors that influence history/future of English language. Race, ethnicity, class, regional/national variation, religion, technology. Gender theories as they relate to social issues, texts, and discourse practices.

EngL 3602W. Gender and the English Language. (4 cr)
Connections between gender and other social factors that influence history/future of English language. Race, ethnicity, class, regional/national variation, religion, technology. Gender theories as they relate to social issues, texts, and discourse practices.

EngL 3603W. World Englishes. (4 cr)
Historical background, psychosocial significance, and linguistic characteristics of diverging varieties of English spoken around world, especially in postcolonial contexts (Caribbean, Africa, Asia). Development of local standards/vernaculars. Sociolinguistic methods of analysis.

EngL 3604. Public Discourse. (3 cr)
Popular culture and media as important modes of cultural discourse: their histories/rhetorics, their systems of production/circulation, their work in constructing us and our work in construing them.

EngL 3606. Literacy and American Cultural Diversity. (4 cr)
Academic study of nature, acquisition, institutionalization, and state of literacy in the United States. Focuses on issues of culturally diverse and disadvantaged members of society. Service-learning component requires tutoring of children/adults in community service agencies.

EngL 3607. Introduction to Academic Literacy. (4 cr)
Theories of literacy in academic disciplines. Different rhetorical conventions across disciplines. Emphasizes improving academic writing using one-to-one tutoring sessions. Service learning as peer tutor, this semester and next.

EngL 3611. History of the English Language. (4 cr)
Development of English language from Old English (mid 5th century) to Middle English (around 1100) to Early Modern English (about 1500).

EngL 3612. Old English I. (3 cr)
Introduction to the language through 1150 A.D. Culture of Anglo-Saxons. Selected readings in prose/poetry.

EngL 3613. Old English II. (3 cr. §5613. Prereq–3612)
Critical reading of texts. Introduction to versification. Readings of portions of Beowulf.

EngL 3621W. Writing Beyond the Academy. (4 cr. Prereq–Completion of fr writing requirement, 60 cr, approved site arranged by [CCLC, director of undergrad studies in English department])
Internship. Analyses of writing styles, genres, and rhetorical contexts outside the academy.

EngL 3632. Electronic Text. (3 cr. §5632)
Status/function of text, related questions as framed by electronic text.

EngL 3633. History of Writing Technologies. (4 cr)
Equivocal relation of memory and writing. Literacy, power, and control. Secrecy and publicity. Alphabetization and other ways of ordering world. Material bases of writing. Typographical design/expression. Theories of technological determinism.

EngL 3641. Editing for Publication. (4 cr)
Practice professional editing of various kinds of texts (e.g., scientific/technical writing). Introduction to editing levels, from substantive revision to copyediting. Computer-mediated editorial practices.

EngL 3870. Figures in English and North American Literature. (3 cr [max 9 cr])
Topics specified in the *Class Schedule*.

EngL 3880. General Topics. (3 cr [max 9 cr])
Topics specified in the *Class Schedule*.

EngL 3881. London Seminar. (3 cr. Prereq–Completion of 3xxx level composition requirement, Δ)
Broad topic of literary investigation crossing and integrating several areas of study. Team taught. "Literature in London" program course.

EngL 3883V. Honors Thesis. (3 cr; A-F only. Prereq–Honors summa cum laude candidacy in Engl, consent of Engl honors adviser)
Honors thesis. See guidelines available from English honors adviser.

EngL 3960. Junior-Senior Seminar. (4 cr [max 8 cr]; A-F only. Prereq–English major, [jr or sr], major adviser approval, Δ)
Intensive study of major literary topic, figure, period, genre, or English language topic. Students complete their senior paper. Topics specified in *Class Schedule*.

EngL 3960W. Senior Seminar. (4 cr [max 8 cr]; A-F only. Prereq–3001, [jr or sr], English major, Δ)
Intensive study of major literary topic, figure, period, genre, or English language topic. Students complete their senior paper. Topics specified in *Class Schedule*.

EngL 3980. Directed Instruction. (1-6 cr. Prereq–#, Δ , ❑)
Directed study arranged between student and advising faculty member.

EngL 3992. Directed Reading. (1-4 cr [max 12 cr]; A-F only. Prereq–#, Δ , ❑)
Guided individual reading.

EngL 3993. Directed Study. (1-8 cr. Prereq–#, Δ , ❑)
Guided individual study.

EngL 3994. Directed Research. (1-4 cr [max 12 cr]. Prereq–#, Δ , ❑)
Directed individual research. Qualified students work on a tutorial basis.

EngL 5001. Introduction to Methods in Literary Studies. (3 cr. Prereq–grad or #)
Ends/methods of literary research, including professional literary criticism, analytical bibliography, and textual criticism.

EngL 5002. Introduction to Literary and Cultural Theory. (3 cr. Prereq–Grad or #)
Approaches to practical/theoretical problems of literary history/genre.

EngL 5100. Readings in Special Subjects. (3 cr [max 9 cr]. Prereq–Grad student or #)
General background preparation for advanced study. Diverse selection of literatures written in English, usually bridging national cultures and time periods. Readings specified in *Class Schedule*.

EngL 5120. Reading in American Literature. (3 cr [max 9 cr]. Prereq–Grad or #)
General background/preparation for advanced graduate study. Readings cover either a wide historical range (e.g., 19th century), a genre (e.g., the novel), or a major literary movement (e.g., Modernism).

EngL 5130. Readings in American Minority Literature. (3 cr [max 9 cr]. Prereq–Grad or #)
Contextual readings of 19th-/20th-century American minority writers. Topics specified in *Class Schedule*.

EngL 5140. Post-Colonial Literatures. (3 cr [max 9 cr]. Prereq–Grad or #)
Selected readings in post-colonial literatures. Topics specified in *Class Schedule*.

EngL 5150. Readings in Criticism and Theory. (3 cr [max 9 cr]. Prereq–Grad or #)
Major works of classical criticism in the English critical tradition from Renaissance to 1920. Leading theories of criticism from 1920 to present. Theories of fiction, narratology. Feminist criticisms. Marxist criticisms. Psychoanalytic criticisms. Theories of postmodernism.

EngL 5210. Middle English Literature and Culture. (3 cr [max 9 cr]. Prereq–Grad student or #)
Wide reading in literature of period. Relevant scholarship/criticism. Topics vary. See *Class Schedule*.

EngL 5230. Early Modern Literature and Culture. (3 cr [max 9 cr])
Topical readings in early modern poetry, prose, fiction, and drama. Attention to relevant scholarship or criticism. Prepares graduate students for work in other courses or seminars.

EngL 5250. 19th-Century Literature and Culture. (3 cr [max 9 cr])
19th-century British, American, and post-Colonial literatures. Topics may include British Romantic or Victorian literatures, 19th-century American literature, important writers from a particular literary school, a genre (e.g., the novel). Readings.

EngL 5270. 20th-Century Literature and Culture. (3 cr [max 9 cr]. Prereq–Grad student or #)
20th-century British, Irish, or American literatures, or topics involving literatures of two nations. Focus either on a few important writers from a particular literary school or on a genre (e.g., drama). Topics specified in *Class Schedule.*

EngL 5291. Contemporary Literature and Culture. (3 cr)
Multi-genre reading in contemporary American, British, Anglophone literature. Relevant scholarship/criticism. Topics vary. See *Class Schedule.*

EngL 5330. Topics in Drama. (3 cr [max 9 cr]. Prereq–Grad student or #)
Wide reading in literature of a given period or subject. Prepares students for work in other courses/seminars. Relevant scholarship/criticism. Topics specified in *Class Schedule.*

EngL 5401. Introduction to Editing. (4 cr)
Editor-writer relationship, manuscript reading, author querying, rewriting, style. Some discussion of copy editing. Students develop editing skills by working on varied writing samples.

EngL 5402. Advanced Editing. (4 cr. Prereq–5401, #, Δ)
Editing long text. Fiction, children's literature, translations, indexes. Workshop/seminar.

EngL 5581. Folklore I. (3 cr. Prereq–Grad student or #)
Folklore genres such as proverbs, oral prose narratives (tales/legends), foodways, and games. Manner in which folklore is transmitted/changed. Focus on how folklore functions in literature, the mass media, and everyday life.

EngL 5582. Folklore II. (3 cr. Prereq–[5581, grad student] or #)
Training in collection of folklore materials.

EngL 5593. The Afro-American Novel. (3 cr. §Afro 5593)
Contextual readings of 19th-/20th-century black novelists, including Chesnut, Hurston, Wright, Baldwin, Petry, Morrison, and Reed.

EngL 5602. Gender and the English Language . (3 cr. Prereq–Grad student or #)
Introduction to features of English that are gender-marked or gender-biased. Connections between language theory and social structures, including class and ethnicity. Patterns of women's/men's speech in specific social contexts. Gender and writing. Sociolinguistics and sexual orientation.

EngL 5603. Varieties of World English. (3 cr. Prereq–Grad student or #)
Historical background, psychosocial significance, and linguistic characteristics of diverging varieties of English spoken around world, especially in postcolonial contexts (Caribbean, Africa, Asia). Development of local standards/vernaculars. Sociolinguistic methods of analysis.

EngL 5605. Social Variation in American English. (3 cr. Prereq–Grad student or #)
Description/analysis of English language variation from sociohistorical perspective in the United States and the Caribbean. Social history of voluntary/enforced migrations leading to development of regional/rural dialects, pidgins, creoles, and urban varieties.

EngL 5611. History of the English Language. (3 cr. Prereq–Grad student or #)
Development of English language from Old English (mid-5th century) to Middle English (around 1100) to Early Modern English (about 1500).

EngL 5612. Old English I. (3 cr. §3612. Prereq–Grad student or #)
Introduction to the language through A.D. 1150. Anglo-Saxon culture. Selected readings in prose/poetry.

EngL 5613. Old English II. (3 cr. §3613. Prereq–[[3612 or 5612], grad student] or #)
Critical reading of texts, introduction to versification. Reading of Beowulf.

EngL 5621. Irish Language I. (5 cr. Prereq–Undergrad English major or Δ)
Grammatical structures of modern Irish dialect of Connemara, Co. Galway. Development of oral/written language skills: vocabulary, manipulation of grammatical structures, speaking, listening, reading, writing. Modern Gaelic culture.

EngL 5622. Irish Language II. (5 cr. Prereq–5621)
Grammatical structures of modern Irish dialect. Development of oral/written language skills: vocabulary, manipulation of grammatical structures, speaking, listening, reading, writing. Modern Gaelic culture.

EngL 5630. Theories of Writing and Instruction. (3 cr. Prereq–Grad student or #)
Introduction to major theories that inform teaching of writing in college and upper-level high school curriculums. Topics specified in *Class Schedule.*

EngL 5631. History of Rhetoric and Writing. (3 cr. Prereq–Grad student or #)
Assumptions of classical/contemporary rhetorical theory, especially as they influence interdisciplinary field of composition studies.

EngL 5632. Electronic Text. (3 cr. §3632. Prereq–Grad student or #)
Status/function of text in electronic networking. Related questions as reframed by electronic text.

EngL 5640. Research Methods in Rhetoric, Composition, and Language. (3 cr. Prereq–Grad student or #)
Research paradigms, methodologies, and procedures (e.g., ethnographic, case-study, historical, critical, quantitative, text-analytical, survey-based). Emphasizes reading/analyzing existing research studies and preparing original research. Topics specified in *Class Schedule.*

EngL 5650. Topics in Rhetoric, Composition, and Language. (3 cr. Prereq–Grad student or #)
Topics specified in *Class Schedule.*

EngL 5690. Minnesota Writing Project: Directed Studies. (1-3 cr [max 30 cr])
Workshops. Theories of writing and writing pedagogy. Writing for publication. Research topics in applied literacy.

EngL 5800. Practicum in the Teaching of English. (2 cr [max 9 cr]; S-N only. Prereq–Grad student, #)
Discussion of and practice in recitation, lecture, small-groups, tutoring, individual conferences, and evaluation of writing/reading. Emphasizes theory informing effective course design/teaching for different disciplinary goals. Topics vary. See *Class Schedule.*

EngL 5992. Directed Readings/Study/Research. (1-15 cr [max 15 cr]. Prereq–Grad student or [#, Δ, ❑])
Guided individual reading.

English: Writing, Rhetoric, and Language (EngC)

Department of English Language and Literature

College of Liberal Arts

EngC 1001. Preparation for University Writing. (4 cr. Prereq–Category 4 placement; some sections may be limited to ESL students)
Guided writing practice in prewriting, drafting, and revising as well as grammar, sentence structure, and paragraphing. For students who are not fully prepared for academic writing. Weekly meetings with a tutor in the Student Writing Center required.

EngC 1011. University Writing and Critical Reading. (4 cr. §1012, §1013, §1014, §1015, §1011H, §GC 1422, §GC 1423, §GC 1424. Prereq–Placement in category 2 or 3; some sections limited to ESL)
Critical reading/interpretation of selected texts. Research in various types of resources. Writing through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1011H. Honors: University Writing and Critical Reading. (4 cr. §1011, §1012, §1013, §1014, §1015, §GC 1422, §GC 1423, §GC 1424. Prereq–Honors, [placement in category 2 or 3])
Critical reading/interpretation of texts, research in various resources, writing through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1012. University Writing and Critical Reading: Perspectives on Multiculturalism. (4 cr. §1011, §1013, §1014, §1015, §1012H, §GC 1422, §GC 1423, §GC 1424. Prereq–Placement in category 2 or 3; some sections limited to ESL)
Extended practice in writing on topics concerning cultural diversity. Projects involving critical reading/interpretation of selected texts, research in various types of resources, and writing that moves through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1012H. University Writing and Critical Reading: Perspectives on Multiculturalism. (4 cr. §1011, §1012, §1013, §1014, §1015, §GC 1422, §GC 1423, §GC 1424. Prereq–Honors, [placement in category 2 or 3])
Extended practice in writing on topics concerning cultural diversity. Critical reading/interpretation of texts, research in various resources, writing through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1013. University Writing and Critical Reading: Nature and the Environment. (4 cr. §1011, §1012, §1014, §1015, §1013H, §GC 1422, §GC 1423, §GC 1424. Prereq–[placement in category 2 or 3]; some sections limited to ESL)
Writing on topics concerning the environment. Critical reading/interpretation of selected texts. Research in various types of resources. Writing through several drafting steps. Finished writing is revised/edited to meet university-level standards.

EngC 1013H. University Writing and Critical Reading: Nature and the Environment. (4 cr. §1011, §1012, §1013, §1014, §1015, §GC 1422, §GC 1423, §GC 1424. Prereq–Honors, [placement in category 2 or 3])
Writing on topics concerning the environment. Critical reading/interpretation of texts, research in various resources, writing through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1014. University Writing and Critical Reading: Contemporary Public Issues. (4 cr. §1011, §1012, §1013, §1015, §1014H, §GC 1422, §GC 1423, §GC 1424. Prereq–Some sections limited to ESL)
Writing on topics concerning citizenship and public ethics. Projects involve critical reading/interpretation of selected texts, research in various types of resources, and writing through several drafting steps. Finished writing is revised/edited to meet university-level standards.

EngC 1014H. University Writing and Critical Reading: Contemporary Public Issues. (4 cr. §1011, §1012, §1013, §1014, §1015, §GC 1422, §GC 1423, §GC 1424. Prereq–Honors)
Writing on topics concerning citizenship, public ethics. Critical reading/interpretation of texts, research in various resources, writing through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1015. University Writing and Critical Reading: Perspectives on Globalization. (4 cr. §1011, §1012, §1013, §1014, §GC 1422, §GC 1423, §GC 1424. Prereq–Placement in category 2 or 3; some sections limited to ESL)
Critical reading/interpretation of selected texts. Research in various types of resources, including Internet. Writing through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1021. Intermediate Expository Writing. (4 cr. Prereq–1011 or 1012 or 1013 or 1014)
Focuses on the range of choices writers make based on audience, purpose, and context. Relies on critical reading and a variety of writing assignments to improve control over writing and the effect it will have on intended audiences.

EngC 1021W. Intermediate Expository Writing. (4 cr. Prereq–1011 or 1012 or 1013 or 1014)
Focuses on the range of choices writers make based on audience, purpose, and context. Relies on critical reading and a variety of writing assignments to improve control over writing and the effect it will have on intended audiences.

EngC 1601W. English Language and Society. (4 cr)
Provides a general, non-technical understanding of the systematic, dynamic and creative nature of human language, with special application to the English language.

EngC 3027W. Advanced Expository Writing. (4 cr. Prereq–Completion of freshman writing requirement)
Incorporating narrative, descriptive, analytical, persuasive techniques into writing on general topics. Effective argumentation through critical reading, use of library resources, awareness of context/audience.

EngC 3603W. World Englishes. (3 cr)
Historical background, psychosocial significance, and linguistic characteristics of diverging varieties of English spoken around the world, especially in postcolonial contexts (Caribbean, Africa, Asia). Development of local standards/vernaculars. Sociolinguistic methods of analysis.

EngC 3605W. Social Variation in American English. (4 cr)
Description and analysis of English language variation from a sociohistorical perspective in the United States and the Caribbean. Social history of migrations (voluntary and enforced) leading to the development of regional and rural dialects, pidgins, creoles and urban varieties.

EngC 3606. Literacy and American Cultural Diversity. (4 cr)
Academic study of the nature, acquisition, institutionalization, and present state of literacy in the United States. Special focus on issues of culturally diverse and disadvantaged members of society. Service-learning component requires tutoring (min. 2 hours per week) of children and adults in community service agencies.

EngC 3621W. Writing Beyond the Academy. (4 cr. Prereq–Completion of freshman writing requirement, 60 cr)
Analyses of writing styles, genres, and rhetorical contexts outside the academy in a semester-long internship. Students must have an approved site arranged by the OSLO office and the Director of Undergraduate Studies of the English Department.

EngC 3650. Topics in Rhetoric, Composition, and Language. (3 cr)
Topics specified in *Class Schedule*.

EngC 5051. Graduate Research Writing Practice for Non-native Speakers of English. (3 cr. Prereq–Grad student)
Graduate-level writing techniques/formats for summaries, critiques, research, and abstracts. Persuasion, documentation, structure, grammar, vocabulary, field-specific requirements. Writing through several drafts, using mentor in specific field of study. Revising/editing to meet graduate standards. Discussions.

EngC 5690. Minnesota Writing Project: Directed Studies. (1-3 cr [max 30 cr])
Workshops in which writing teachers investigate current theories of writing and writing pedagogy, write for publication, and explore research topics in applied literacy.

Entomology (Ent)

Department of Entomology

College of Agricultural, Food and Environmental Sciences

Ent 3001. Insects and Insect Management. (1 cr. Prereq–Biol 1009 or equiv)
Principal orders of insects/arachnids. Introduction to structure, physiology, population dynamics, and management. Lecture/lab. Meets in weeks 1-4.

Ent 3005. Insect Biology. (3 cr)
Survey of diversity/biology of insects. Insect behavior (including social insects), pollination, herbivory, insects as disease vectors, beneficial insects, insect population dynamics/ecology. Emphasizes insects' role in agricultural, urban, natural systems. Lecture/lab. Required Saturday field trip on second weekend of semester.

Ent 4005. Economic Entomology. (3 cr; A-F only)
Management of insect populations. Life histories. Habits/recognition of insect pests of field/vegetable crops. Lecture/lab.

Ent 4015. Ornamentals and Turf Entomolgy. (3 cr. Prereq–1xxx course in biol or hort or forest resources)
Diagnosis and management of insect pests in landscape plants. Emphasis on the principles of biological control, biorational pesticides, and integrated pest management.

Ent 4021. Honey Bees and Insect Societies. (3 cr. Prereq–Biol 1009 or #)
Natural history, identification, and behavior of honey bees and other social insects. Evolution of social behavior, pheromones and communication, organization and division of labor, social parasitism. Lab with honey bee management and maintenance of other social bees for pollination.

Ent 4022. Honey Bee Management. (1 cr. Prereq–¶4021 recommended, Biol 1009 or #)
Field course for students interested in honey bee management and the conservation and maintenance of other bee pollinators. Work with live bee colonies and participate in field research problems related to honey bee behavior and management.

Ent 4096. Professional Experience Program: Internship. (1-3 cr; S-N only. Prereq–COAFES jr or sr, #, complete internship contract available in COAFES Career Services before registering)
Professional experience in entomology firms or government agencies through supervised practical experience; evaluative reports and consultations with faculty advisers and employers.

Ent 4231. Insect Behavior. (3 cr; A-F only. Prereq–Biol 1009 or equiv or #; [3005 or EEB 3111] recommended)
Diversity of behavior in insects. Modes of perception, ways in which stimuli are translated into behavior. Genetic basis of behavior. Behavioral traits with Mendelian and more complex modes of inheritance. Natural history of insect behavior. Emphasizes how evolution has shaped diversity of behaviors. Movement/dispersal, feeding, defense/escape, mating/reproduction, sociality. Case studies.

Ent 4251. Forest and Shade Tree Entomology. (3 cr)
Biology, ecology, population management of forest/shade tree insects. Emphasizes predisposing factors/integrated management. Lecture/lab. Required Saturday field trip on second weekend of semester.

Ent 4281. Veterinary Entomology. (3 cr; A-F only)
Biology/management of insects, mites, ticks that affect livestock, poultry, companion animals. Emphasizes problem identification/solving. Lecture, lab.

Ent 5011. Insect Structure and Function. (4 cr; A-F only. Prereq–3005 or #)
Comparative study of insect structures/functions from evolutionary perspective. Introduction to physiology of digestion, respiration, other organ systems.

Ent 5021. Insect Taxonomy and Phylogeny. (4 cr. Prereq–3001 or equiv)
Identification of families of adult insects; evolution and classification of insects; techniques of collecting and curating insects; principles of phylogeny reconstruction.

Ent 5031. Insect Physiology. (2 cr; A-F only. Prereq–5011, biochem course or #)
Essential processes of insects. Nerve and muscle mechanisms, energy metabolism, respiration, nutrition and digestion, excretion, regulation and interactions of processes, sensory mechanisms, and behavior. Reproductive behavior, embryology, and postembryonic development of insects.

Ent 5041. Insect Ecology. (3 cr. Prereq–Biol 5041 or EBB 5122 or #; offered fall 1998 and alt yrs)
Synthetic analysis of the causes of insect diversity and of fluctuations in insect abundance. Focus on abiotic, biotic, and evolutionary mechanisms influencing insect populations and communities.

Ent 5211. Insect Pest Management. (3 cr. Prereq–3005 or #)
Prevention or suppression of injurious insects by integrating multiple control tactics, e.g., chemical, biological, cultural. Strategies to optimize the dynamic integration of control methodologies in context of their economic, environmental, and social consequences.

Ent 5241. Ecological Risk Assessment. (3 cr. Prereq–#)
Evaluating current/potential impact of physical, chemical, biological agents on ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating/managing risks. Class participation, two reaction papers, final exam, small-group project.

Ent 5275. Medical Entomology. (3 cr. Prereq–3005 or #; offered 1998 and alt yrs)
Biology of arthropod vectors of human disease. Emphasis on disease transmission and host, vector, and pathogen interactions.

Ent 5311. Sampling Biological Populations. (3 cr. Prereq–Stat 5021 or equiv)
Sampling plans for study of field/lab populations. Statistical distributions/techniques for detecting/coping with aggregation. Randomization, required sample size, optimal allocation for common probability design. Sequential plans for making decisions.

Ent 5321. Ecology of Agricultural Systems. (3 cr; A-F only. §Agro 5321. Prereq–[[3xxx or above] course in [Agro or AnSc or Hort], [3xxx or above] course in [Ent or PlPa or Soil]] or #)
Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied.

For definitions of course numbers, symbols, and abbreviations, see page 296.

Ent 5341. Biological Control of Insects and Weeds. (3-4 cr; A-F only. Prereq–3001, Biol 1009, EEB 3001 or grad)
Biological control of arthropod pests and weeds. Analysis of relevant ecological theory and case studies; biological control agents. Lab includes natural enemy identification, short experiments, and computer exercises.

Ent 5351. Insect Pathology. (2 cr. Prereq–5011)
Major pathogenic microorganisms that cause diseases in insects. Routes of infection of insects. Lab propagation of disease agents. Factors in application of disease to pest insect control. Safety considerations.

Ent 5361. Aquatic Insects. (4 cr; A-F only. Prereq–#)
Taxonomy, natural history of aquatic insects including their importance in aquatic ecology, water resource management, recreation, and conservation. Emphasizes family-level identification of immatures/adults. Field trips scheduled to local aquatic habitats. A collection is required.

Ent 5371. Principles of Systematics. (3 cr. Prereq–#; offered alt yrs)
Theoretical/practical procedures of biological systematics. Phylogeny reconstruction, including computer assisted analyses, morphological/molecular approaches, species concepts, speciation, comparative methods, classification, historical biogeography, nomenclature. Use/value of museums.

Ent 5381. Lepidopterology. (2-3 cr. Prereq–Ent course or #, one course each in ecology and genetics recommended)
Overview of Lepidoptera with emphasis on processes and phenomena such as polymorphism, mimicry, and individual quality that are well demonstrated by this insect order.

Ent 5481. Invertebrate Neurobiology. (2-3 cr. §NSc 5481)
Fundamental principles/concepts underlying cellular bases of behavior/systems neuroscience. Particular invertebrate preparations.

Ent 5900. Basic Entomology. (1-6 cr. Prereq–#)
For graduate students who need to make up certain deficiencies in their biological science background.

Ent 5910. Special Problems in Entomology. (1-6 cr [max 10 cr]. Prereq–#)
Individual field, lab, or library studies in various aspects of entomology.

Ent 5920. Special Lectures in Entomology. (1-3 cr)
Lectures or labs in special fields of entomological research. Given by visiting scholar or regular staff member.

Environmental Science (ES)

College of Agricultural, Food and Environmental Sciences

ES 1011. Issues in the Environment. (3 cr)
Insight and analysis of environmentally stressed situations. Modes of avoiding and redressing pollution in the context of cultural and social systems and customs. Review current environmental issues through various media presentations by faculty and invited speakers.

ES 1051. Introduction to Environmental Science. (3 cr. Prereq–§Biol 1051)
Current environmental issues including air and water pollution, human population, toxic and hazardous wastes, urbanization, land use, biological diversity, energy, attitudes toward nature, environmental politics, and ethics.

ES 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]. Prereq–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering)
Both an oral and written report is done based on a paid or volunteered work position, or other field experience.

Family Education (FE)

Department of Work, Community, and Family Education

College of Education and Human Development

FE 5001. Family Education Perspectives. (3 cr; A-F only)
Origins, evolution, and critique of alternative perspectives on family education. Implications for clients, programs, and educators.

FE 5003. Contemporary Family Education. (3 cr; A-F only)
Transitions in family life examined, with emphasis on preparing educators and educational programs.

FE 5200. Special Topics in Family Education. (1-4 cr [max 20 cr])
Topics either not covered in available courses or not covered in sufficient breadth/depth to meet student needs/interests. Topics vary.

FE 5201. Family and Work Relationships. (3 cr; A-F only)
Examination of the interactions of work and family to prepare professionals for improving work and family relationships.

FE 5202. Sexuality Education. (3 cr; A-F only. Prereq–Human sexual behavior course, family ed course)
Preparation to develop, deliver, and evaluate sexuality education. Strategies to help children and adults acquire information, form values, develop interpersonal skills, and exercise personal responsibility in the sexual dimensions of individual and family life.

FE 5203. Family Communication Education. (3 cr; A-F only)
Knowledge and skills needed to develop, deliver, and evaluate educational programs about family communications. Examination of family communications principles and issues. Development of appropriate teaching methods and materials.

FE 5301. Program Planning in Family Education. (3 cr; A-F only)
Exploration of curriculum research and theory; examination and critique of alternative perspectives and their concomitant implications for families; development and evaluation of family education curriculum and programs.

FE 5302. Family Education Curriculum in Secondary Schools. (3 cr; A-F only. Prereq–STEPP student)
Examination, development, and implementation of family and consumer science curriculum in secondary schools. Emphasizes curricular perspectives from social reconstruction and cognitive processes.

FE 5303. Instructional Strategies in Family Education. (3 cr; A-F only. Prereq–STEPP student)
Theory/research relevant to methods of teaching. Emphasizes methods that support families taking technical, communicative, and emancipatory action.

FE 5701. Practice of Parent Education I. (3 cr; A-F only)
Examination of parent education in community settings; consideration of parents as adult learners with diverse backgrounds; development of group facilitation skills; observation and interviewing in community settings; reflection on and critique of the practice of parent education.

FE 5702. Practice of Parent Education II. (3 cr; A-F only. Prereq–5701 or Δ)
Development of curriculum for parent education; consideration of teaching groups and individuals; consideration of ethics in parent education; evaluation of parent education programs; development of curriculum and teaching portfolio; reflection on and critique of the practice of parent education.

FE 5703. Advanced Practice of Parent Education. (3 cr. Prereq–5702 or Δ)
Evolving perspectives of parent education. Emphasis on psycho-dynamic, conceptual-change approaches. Reflective and dialogic approaches for working with parents in understanding beliefs and examining their origins and consequences. Examination of issues related to diversity, self-awareness, ethics, and evaluation.

FE 5796. Parent Education Practicum. (1-4 cr [max 4 cr]. Prereq–5702 or Δ)
Supervised parent education field assignments designed according to licensure requirements and individual student needs, interests, and prior competencies.

FE 5993. Directed Study in Family Education. (1-3 cr [max 9 cr]; A-F only. Prereq–Δ)
Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member.

FE 5996. Internship in Family Education. (1-6 cr [max 6 cr]. Prereq–Δ)
Planned work experience focusing on educational competencies in family education settings. Nature and extent of responsibilities are defined by the position student assumes.

Family Social Science (FSoS)

Department of Family Social Science

College of Human Ecology

FSoS 1101. Intimate Relationships. (3 cr)
Focuses on couple dynamics and gives an overview of how to develop, maintain, and terminate an intimate relationship. Relationship skills and issues including communication, conflict resolution, power, and roles. Programs for marriage preparation, marriage enrichment, and marital therapy are described.

FSoS 2101. Preparation for Working With Families. (2 cr; A-F only)
Systematic preparation for upper division education, research/field internships, and career possibilities in family social science.

FSoS 2191. Independent Study in Family Social Science. (1-4 cr [max 12 cr]. Prereq–Soph, #)
Independent reading or writing or research under faculty supervision.

FSoS 3101. Personal and Family Finances. (3 cr. Prereq–Soph or #)
Analysis of personal and family financial management principles. Financial planning of savings, investments, credit, mortgages, and taxation; life, disability, health, and property insurance; public/private pensions. Estate planning.

FSoS 3102. Family Systems and Diversity. (3 cr. Prereq–Soph or #)
Family systems/theories applied to dynamics/processes relevant to family life. Diversity issues related to gender, ethnicity, sexual orientation, and disability. Divorce, single parenthood, remarriage. Family strengths/problems.

FSoS 3150. Special Topics in Family Social Science. (1-4 cr [max 4 cr]. Prereq–[Varies by topic], at least soph)
Review of research/scholarly thought. Topics specified in *Class Schedule*.

FSoS 3191. Independent Study in Family Social Science. (1-5 cr [max 12 cr]. Prereq–Jr, #)
Independent reading or writing or research under faculty supervision.

FSoS 3426. Alcohol and Drugs: Families and Culture. (3 cr. §5426)
Psychology/sociology of drug use/abuse. Life-span, epidemiological, familial, cultural data regarding use. Fundamentals of licit/illicit drug use behavior. Variables of gender, ethnicity, social class, sexuality, sexual orientation, disability.

FSoS 3429. Counseling Skills Practicum I. (3 cr. §5429)
Basic counseling skills. Counselor needs/motivations, non-verbal communication, basic/advanced empathy, identifying strengths, maintaining focus, challenging discrepancies, use of self. Emphasizes building from client strengths, learning through role-playing.

FSoS 3431. Counseling Skills Practicum II. (3 cr. §5431. Prereq–[3429, 5429])
Advanced therapeutic methods. Processes of change. Identifying, reinforcing, challenging core beliefs. Reframing. Paradox. Trance, guided imagery. Cognitive-behavioral, solution-focused, narrative therapies. Emphasizes non-pathologizing models of therapy.

FSoS 3432. Chemical Abuse and Families: an Overview. (3 cr. §5432)
Relationships, family systems, families in which alcohol or drug use is a problem. Family types, family of origin, models of family therapy, family systems theory, alcoholism. Review of literature.

FSoS 4101. Sexuality and Gender in Families and Close Relationships. (3 cr. Prereq–3102 or #)
Human ecology/development as frameworks for examining sexuality in close relationships. Diversity of sexual beliefs, attitudes, behaviors within differing social contexts. Using scientific knowledge to promote sexual health among individuals, couples, families through various life stages.

FSoS 4102. Global and Diverse Families. (3 cr. Prereq–3102 or #)
Perspectives on family dynamics of various racial/ethnic populations in the United States/other countries in context of national/international economic, political, and social processes.

FSoS 4103. Family Policy. (3 cr. Prereq–3102 or #)
Connections between policies that governments enact, and families and their well-being. Conceptual frameworks to identify/understand influences underlying policy choices and for evaluating consequences of such choices for diverse families.

FSoS 4104W. Family Psychology. (3 cr. Prereq–3102 or #)
Processes in families of origin, families of choice, and other close relationships, within diverse social contexts. Evaluating current research on family dynamics within/across generations.

FSoS 4105. Methods in Family Research. (3 cr. Prereq–[3102, one introductory course in statistics] or #)
Scientific method. Major questions/objectives of family research. Data collection/analysis/reporting. Social context of family research.

FSoS 4106. Family Resource Management. (3 cr. §3103. Prereq–Soph or #)
Analysis of how individuals/families use interpersonal, economic, natural, and community resources to make decisions, solve problems, and achieve central life purposes.

FSoS 4150. Special Topics in Family Social Science. (1-4 cr [max 12 cr]. Prereq–[Varies by topic], at least jr)
Review of research/scholarly thought. Topics specified in *Class Schedule.*

FSoS 4152. Gay, Lesbian, and Bisexual People in Families. (3 cr. Prereq–3102 or #)
Perspectives on gay, lesbian, and bisexuals (GLB) in families. Unique contributions of GLB to understanding diversity among families. Homophobia, mythologies, coming-out, identity, gender, social networks, intimacy, sexuality, children, parenting, aging, AIDS, ethnicity.

FSoS 4153. Family Financial Counseling. (3 cr; A-F only. Prereq–[3101, 3102, 3429] or #)
Introduction to family financial management applications through different stages in family financial life cycle. Case studies.

FSoS 4154W. Families and Aging. (3 cr. Prereq–3102 or #)
Aging families from diverse socioeconomic/cultural groups as complex multigenerational systems interacting within ever-changing social structures.

FSoS 4155. Parent-Child Relationships. (3 cr; A-F only. Prereq–3102 or #)
History, theories, research, and contemporary practices of parent-child relationships in diverse families/cultures across the life span. Preparation for professionals in education, social work, and other human service occupations.

FSoS 4156. Legal-Economic Controversies in Families. (3 cr. Prereq–[3101] or #)
Interdisciplinary course for critical thinking about legal-economic controversies across family life span. Principles of argumentation/debate are used to analyze controversies for public decision making about controversial family issues.

FSoS 4191. Independent Study in Family Social Science. (1-4 cr [max 12 cr]. Prereq–Sr, #)
Independent reading or writing or research under faculty supervision.

FSoS 4294. Research Internship. (1-4 cr [max 4 cr]. Prereq–FSoS major, #)
Research project with faculty. May include planning, proposal writing, literature review, data collection/coding/cleaning/analysis, and reporting.

FSoS 4296. Field Study: Working With Families. (4-12 cr [max 12 cr]; S-N only. Prereq–2101, #)
Directed paraprofessional work experience related to student's area of study.

FSoS 5101. Family Systems. (3 cr. §3102. Prereq–Grad student)
Family systems and other family theories focusing on the dynamics and processes relevant to family life. Diversity issues related to gender, ethnicity, sexual orientation, and disability. Issues related to divorce, single parenthood, and remarriage are covered. Family strengths and family problems are integrated.

FSoS 5193. Directed Study in Family Social Science. (1-6 cr [max 6 cr]. Prereq–FSoS or grad student in related field)

FSoS 5426. Alcohol and Drugs: Families and Culture. (3 cr. §3426)
Overview of psychology/sociology of drug use/abuse. Life-span, epidemiological, familial, cultural data regarding use. Fundamentals of licit/illicit drug use behavior. Gender, ethnicity, social class, sexuality, sexual orientation, disability.

FSoS 5429. Counseling Skills Practicum I. (3 cr. §3429)
Basic counseling skills. Counselor needs/motivations, non-verbal communication, basic/advanced empathy, identifying strengths, maintaining focus, challenging discrepancies, use of self. Emphasizes building from client strengths, learning through role-playing.

FSoS 5431. Counseling Skills Practicum II. (3 cr. §3431. Prereq–[3429, 5429])
Advanced therapeutic methods, processes of change. Identifying, reinforcing, challenging core beliefs. Reframing, paradox, trance, guided imagery. Cognitive-behavioral, solution-focused, narrative therapies. Emphasizes non-pathologizing models of therapy.

FSoS 5432. Chemical Abuse and Families: an Overview. (3 cr. §3432)
Relationships, family systems with particular application to families in which alcohol or drug use is a problem. Family types, family of origin, models of family therapy, family systems theory, alcoholism. Review of literature.

Finance (Fina)

Department of Finance

Curtis L. Carlson School of Management

Fina 3001. Finance Fundamentals. (3 cr; A-F only. Prereq–Acct 2050, OMS 1550, 50 cr)
Comprehensive introduction to financial management principles. Money/capital markets, risk/return/valuation triad, capital budgeting basics. Capital structure, financial leverage. Cost of capital, financial performance measures, dividend policy, working capital management, international financial management/derivatives.

Fina 4121. Financial Markets and Interest Rates. (2 cr; A-F only. Prereq–4241)
Basic framework for valuing fixed income securities. Term structure on interest rates, forward rates, principles of fixed-income valuation. Surveys treasury, corporate, municipal, securitization markets.

Fina 4122. Banking Institutions. (2 cr; A-F only. Prereq–4121, 4241)
Managing banking institutions, including commercial banks and thrifts. Theory/practice of banking. Asset management, liability management, capital management. Public policy issues in banking.

Fina 4241. Corporate Financing Decisions. (4 cr; A-F only. Prereq–3001)
Theoretical/applied understanding of corporate financial decisions. Efficient markets, financial decisions, tax effects, managerial incentives, investment banking, effect of financing issues on investment decisions, basic options.

Fina 4242. Corporate Investment Decisions. (4 cr; A-F only. Prereq–4241)
Focuses on efficiently managing working capital and fixed assets. Cases illustrate some of the topics: working capital management, making capital budgeting decisions, targeting/evaluating firm performance, assessing mergers/acquisitions.

Fina 4321. Portfolio Management and Performance Evaluation. (2 cr; A-F only. Prereq–4241)
Introduces investment environment and concepts used to manage security portfolios. Portfolio/security risk/return tradeoffs, portfolio diversification, asset allocation, active portfolio management versus indexed portfolios, portfolio performance evaluation.

Fina 4322. Security Analysis. (2 cr; A-F only. Prereq–4241, 4321)
Valuation of equity securities. Basic valuation principles. Relationships between various valuation approaches. Develops/applies tools for self-designed security selection rules.

Fina 4541. Futures, Options, and Other Derivative Securities. (4 cr; A-F only. Prereq–4121, 4241, 4321)
Foundations of stochastic cash flow representations, construction portfolios of futures/options, basic methods for valuing real/financial futures, swaps, options.

Fina 4641. International Finance and Risk Management. (4 cr; A-F only. Prereq–3001)
Introduction to international dimensions of corporate financing, investment, risk management decisions. Foreign exchange markets, international financial systems, foreign exchange rate determination, measuring/managing currency risk, multinational capital budgeting, cost of capital in emerging economies.

Finnish (Fin)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

Fin 1001. Beginning Finnish. (5 cr)
Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include every day subjects (shopping, directions, family, food, housing, etc.).

Fin 1002. Beginning Finnish. (5 cr. Prereq–1001)
Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and the Finnish culture.

Fin 1003. Intermediate Finnish. (5 cr. Prereq–1002)
Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments.

Fin 1004. Intermediate Finnish. (5 cr. Prereq–1003)
Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments.

Fin 3011. Advanced Finnish. (4 cr. Prereq–Passing score on GPT)
Designed to help students achieve advanced proficiency in Finnish. Discussion of fiction, film, journalistic, and professional prose is complemented by grammar and vocabulary building exercises and a systematic review of oral and written modes of communication.

Fin 3012. Advanced Finnish. (4 cr. Prereq–Passing score on GPT)
Discussion of novels, short stories, plays, articles. Structural, stylistic, vocabulary-building exercises.

Fin 4001. Beginning Finnish. (2 cr. §1001. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Fin 1001; see Fin 1001 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Fin 4002. Beginning Finnish. (2 cr. §1002. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Fin 1002; see Fin 1002 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Fin 4003. Intermediate Finnish. (2 cr. §1003. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Fin 1003; see Fin 1003 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Fin 4004. Intermediate Finnish. (2 cr. §1004. Prereq–Passing score on GPT in another language or grad)
Meets with Fin 1004; see Fin 1004 for description. This option is for students who have satisfied the GPT requirements in another language or are graduate students or otherwise exempt.

Fisheries and Wildlife (FW)

Department of Fisheries, Wildlife, and Conservation Biology

College of Natural Resources

FW 1001. Orientation in Fisheries, Wildlife, and Conservation Biology. (1 cr; A-F only)
Survey of technical requirements and education needed for careers in fisheries, wildlife, and conservation biology. Introduction to fields of work, problems, career opportunities.

FW 1002. Wildlife: Ecology, Values, and Human Impact. (3 cr. Prereq–Recommended for students without natural science background)
Controversial issues involving specific wildlife management principles/techniques.

FW 2001. Introduction to Fisheries, Wildlife, and Conservation Biology. (3 cr. Prereq–Biol 1001 or Biol 1009)
Theory/practice of fisheries and wildlife management. Single species populations, ecosystem, landscape approaches. Biota, habitat, sociopolitical aspects of human use. Case studies explore current issues in conservation.

FW 3003. Wildlife in Agricultural Land. (2 cr)
Ecology/management of fish/wildlife in areas of intensive agriculture. Conservation/management practices for fish/wildlife on land used for agriculture.

FW 4001. Biometry. (4 cr; A-F only. Prereq–Math 1031)
Basic statistical concepts such as probability, sampling space, and frequency distributions. Descriptive statistics: sample tests, linear regression (simple and multiple), ANOVA, goodness of fit, nonparameteric method and other relevant selected topics (e.g., clustering and classification).

FW 4104. Hunting and Fishing Traditions: Field Sports Reflected in Arts, Literature, and Practice. (3 cr; S-N only. Prereq–#)
Philosophical foundations, history, traditions, and current importance of field sports in North American society. Laboratory sessions introduce making/using modern sport fishing equipment. Optional experiential learning laboratory introduces safe handling/operation of firearms, leading to State of Minnesota Firearms Safety Certificate. Lectures, invited guests, readings.

FW 4105. Hunting and Fishing Traditions: Field Sports Reflected in Arts, Literature, and Practice. (2 cr; S-N only. Prereq–#)
Philosophical foundations, history, traditions, and current importance of field sports in North American society. Laboratory sessions introduce making/using modern sport fishing equipment. Optional experiential learning laboratory introduces safe handling/operation of firearms, leading to State of Minnesota Firearms Safety Certificate. Lectures, invited guests, readings.

FW 4106. Important Plants in Fisheries and Wildlife Habitats. (1 cr; A-F only. Prereq–4108)
Field identification of important plants in fisheries and wildlife habitats.

FW 4108. Field Methods in Research and Conservation of Vertebrate Populations. (3 cr; A-F only. Prereq–Biol 3407)
Planning/implementation of research/management projects. Collect/analyze data in groups. Group/individual oral/written reports. Each student keeps a field journal.

FW 4129. Mammalogy. (4 cr; A-F only. Prereq–Biol 2012 or #)
Evolutionary and biogeographic history of mammalia. Recognize, identify, and study natural history of mammals at the ordinal level, North American mammals at familial level, and mammals north of Mexico at generic level. Minnesota mammals at specific level.

FW 4136. Ichthyology. (4 cr. Prereq–Biol 2012)
Fish biology, adaptations to different environments and modes of living, and evolutionary relationships. Laboratory emphasizes anatomy and identification of Minnesota fishes.

FW 4200H. Honors Seminar. (1 cr; A-F only. Prereq–FW upper div honors, #)
Current topics presented by faculty/students. Lecture/discussion.

FW 4291. Independent Study: Fisheries. (1-5 cr. Prereq–#)
Individual field, library, and lab research in fisheries.

FW 4292. Special Lectures: Fisheries. (1-5 cr. Prereq–#)
Lectures in special fields of fisheries given by visiting scholar or regular staff member.

FW 4391. Independent Study: Wildlife. (1-5 cr. Prereq–#)
Individual field, library, and lab research in wildlife.

FW 4392. Special Lectures: Wildlife. (1-5 cr. Prereq–#)
Lectures on special topics of wildlife given by visiting scholar or staff member.

FW 4401W. Introduction to Fish Physiology and Behavior. (4 cr. Prereq–Biol 1001 or Biol 1009)
How life in aquatic environment has influenced fish biology. Ionic/osmotic balance, sensory systems, gas exchange, endocrinology, growth, foraging, locomotion, reproduction, orientation/migration, toxicology.

FW 4565. Fisheries and Wildlife Ecology and Management: Field Trip. (1 cr; S-N only. Prereq–#)
Ten-day field trip to Wyoming and points en route during spring break. Emphasizes broad range of fisheries and wildlife management, including big game, waterfowl, endangered species.

FW 4701. Fisheries and Wildlife Problem Solving. (2 cr [max 2 cr]. Prereq–FW sr or grad student or #)
Management problem identification/analysis, information gathering/analysis, oral/written reporting. Selected management issues.

FW 4801H. Honors Research. (2 cr; A-F only. Prereq–FW upper div honors, #)
Independent research project supervised by faculty member.

FW 4802H. Honors Research. (2 cr; A-F only. Prereq–FW upper div honors, #)
Completion of honors thesis. Oral report.

FW 5003. Human Dimensions of Biological Conservation. (3 cr. Prereq–[Biol 1001 or Biol 1009], Biol 3407)
Survey of social, psychological, economic, policy aspects of managing/conserving wildlife, fisheries, and related resources.

FW 5051. Analysis of Populations. (3-4 cr. Prereq–[[Biol 1001 or Biol 1009], [FW 4001 or Stat 3011 or Stat 5021]] or #)
Factors involved in regulation, growth, general dynamics of populations. Data needed to describe populations, population growth, population models, regulatory mechanisms.

FW 5411. Aquatic Toxicology. (3 cr. Prereq–Intro chem, intro ecol, #)
Pollution assessment approaches, biological effects, fate/flow of contaminants in aquatic systems, major types of pollutants.

FW 5455. Sustainable Aquaculture. (3 cr; A-F only. Prereq–Biol 2012, Chem 1021, Math 1031] or #)
Role of aquaculture in fisheries management, biodiversity rehabilitation, and food production around the world. Implications for sustainability of human-environment interactions in different societies. Principles of fish husbandry.

FW 5571. Avian Conservation and Management. (3 cr. Prereq–EEB 4134 or grad or #)
Current problems in avian conservation/management. Nongame, wetland, game birds.

FW 5601. Fisheries Population Analysis. (3 cr; A-F only. Prereq–[4001 or Stat 5021], Biol 3407, [Math 1192 or Math 1271])
Introduction to theory/methods for estimating vital statistics of fish populations. Using microcomputers/statistical software to describe, analyze, model attributes of fish populations. Case studies from literature of marine/freshwater fisheries management.

FW 5603W. Habitats and Regulation of Wildlife. (3 cr; A-F only. Prereq–Biol 3407)
Environmental interactions of wildlife at population/community levels. Environmental threats from human activities. Habitat management practices. Objectives, polices, regulations in population management.

FW 5604W. Fisheries Ecology and Management. (3 cr. Prereq–EEB 4601)
Managed species/systems. Applied aquatic/fish ecology related to fisheries. Role of planning in fisheries management. Application of management tools, assessment of their efficacy.

FW 5625. Wildlife Handling and Immobilization for Research and Management. (2 cr; S-N only. Prereq–General biology, [grad student or vet med student or FW sr], Δ)
Practical techniques to maximize human/animal safety and encourage effective operations. Preparation procedures, legal responsibilities, capture drugs/delivery systems, safety measures, ethical issues, basic veterinary procedures for handling wildlife. Field course. Uses live animals.

Food Science and Nutrition (FScN)

Department of Food Science and Nutrition

College of Agricultural, Food and Environmental Sciences

FScN 1012. Sports Nutrition. (2 cr)
Physiological function and metabolic fate of all six classes of nutrients ingested by active individuals to improve athletic performance. Impact on physiology of ergogenic aids and various dietary supplements. Overview of these components in fulfilling energy/recovery needs for continual/progressive athletic performance. Web-based course.

FScN 1013. Dietary Supplements: scientific, regulatory, and cultural aspects. (3 cr)
Use of dietary supplements in the U.S. How to measure risk of a dietary supplement, approach used by National Institute of Medicine for dietary recommendations. Dietary Supplements Health and Education Act, FTC responsibilities. How dietary supplements are marketed. Other cultures as sources of supplements. Intellectual property rights of indigenous cultures. Use of supplements for health/performance. Course is online.

FScN 1021. Introductory Microbiology. (4 cr)
Broad introduction to the diverse world of microbes and how they impact our world in both deadly and life-saving ways.

FScN 1102. Food: Safety, Risks, and Technology. (3 cr)
Ethical use of public policy and food technology to reduce or control risks in our food supply. Survey of microbiological, chemical, and environmental risks, and government and industry controls used to ensure food safety.

FScN 1112. Principles of Nutrition. (3 cr. Prereq–High school [biology, chemistry])
Fundamental concepts of nutrition, nutrient functions, human nutritional requirements, food sources. Evaluating nutrition information/food safety. Role of nutrition in chronic disease, public policy, and the environment.

FScN 1511. Food Animal Products for Consumers. (3 cr. §AnSc 1511)
The compositional variation, processing, selection, storage, cookery, palatability, nutritional value, and safety of red meat, poultry, fish, and dairy products.

FScN 3102. Introduction to Food Science. (3 cr. Prereq–Chem 1022)
Introduction to composition of and chemical/physical properties of foods. Evaluating interaction/reaction of foods due to formulation, processing, and preparation.

FScN 3612. Life Cycle Nutrition. (3 cr. Prereq–1112, Chem 1022)
Nutritional changes throughout lifecycle. Pregnancy, lactation, childhood, adulthood, aging. Topics relevant to lifecycle changes (e.g., body composition, immunity, sports nutrition).

FScN 3614. Nutrition Education and Counseling. (3 cr. Prereq–1112)
Application of theories/principles of learning, behavior change, instructional methods to nutrition education and counseling in community settings.

FScN 3615. Sociocultural Aspects of Food, Nutrition, and Health. (3 cr. Prereq–1112)
Sociocultural aspects of regional and cultural diversity in food preferences and food behavior, food habits, demographics, lifestyles, food consumption, and expenditures. Effect of socioeconomic status, religious beliefs, age, and cultural meaning of food on food choices.

FScN 3662. Introduction to Dietetic Practice. (2 cr; A-F only. Prereq–1112, admitted to Coordinated Program in Dietetics, #)
Introduction to the practice of dietetics in medical centers, residential care centers, ambulatory care clinics, and community service agencies.

FScN 3731. Food Service Operations Management Laboratory. (2 cr; A-F only. Prereq–[3102 or ¶3102], [3732 or ¶3732])
Experience in managing a food service operation. On-/off-campus commercial/institutional restaurants used as labs. Required field trips.

FScN 3732. Food Service Operations Management. (3 cr; A-F only. Prereq–3102 or ¶3102)
Planning, preparing, delivering, serving, managing foods served away from home.

FScN 3796. Field Experience in Food Service Management. (3 cr; A-F only. Prereq–[3732 or ¶3732], admitted to Coordinated Dietetics Program, #)
Supervised food service production/management experience in a community or health care facility.

FScN 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; A-F only. Prereq–FScN undergrads, #)
Supervised practical and professional experience in food industry firms or government agencies; evaluative reports and consultations with faculty advisors and employees. Registration information in COAFES Career Services.

FScN 4103. World Food Problems. (3 cr. §Agro 4103, §ApEc 4103, §CAPS 4103. Prereq–Jr or sr or grad)
A multidisciplinary look at problems and possible solutions in food production, storage, and utilization in developing countries. Presentations and discussions introduce conflicting views of population, use of technology, and ethical and cultural values of people in various parts of the world.

FScN 4111. Food Chemistry. (3 cr. Prereq–3102, BioC 3021)
Study of chemical structures and functional properties of food components in relation to their roles as parts of complex biochemical systems and as modified by environmental and processing factors.

FScN 4121. Food Microbiology and Fermentations. (3 cr. Prereq–1102, [VPB 2032 or MicB 3301 or MicB 2032], BioC 3021)
Relationship of environment to occurrence, growth, and survival of microorganisms in foods, methods of evaluation, genera and species of importance, control of food-borne pathogens and spoilage organisms in foods, and use of microorganisms in food fermentations.

FScN 4122. Laboratory Methods in Food Microbiology and Fermentations. (2 cr; A-F only. Prereq–¶4121)
Microbiological methods for analysis of foods. Use of microorganisms for production of foods.

FScN 4131. Food Quality. (3 cr. Prereq–4111, 4121)
Management systems in the processing and distribution of foods that insure food quality and compliance with food laws and regulations. Quality management, HACCP, audits, plant/equipment design for sanitation, specifications, recalls, and control systems.

FScN 4210. Topics in Food Science and Nutrition. (1-4 cr [max 8 cr]. Prereq–#)
In-depth investigation of a specific topic in nutrition and food science not covered by other courses. Topic announced in advance.

FScN 4291. Independent Study. (1-4 cr [max 4 cr]. Prereq–Undergrads, #)
Individual lab or library research in an area related to food science or nutrition.

FScN 4312W. Food Analysis. (4 cr. Prereq–4111, Stat 3011)
Examination of components in foods with analytical measurement as the primary focus. Chemical, physical, and sensory techniques are used to identify and characterize major and minor components in food systems.

FScN 4331. Food Process Engineering I. (3 cr; A-F only. Prereq–3102, Math 1272, [Phys 1102 or Phys 1302])
Specific applications of engineering principles (e.g., heat/mass transfer, kinetics, thermodynamics) to unit operations in food production.

FScN 4332. Food Process Engineering II. (4 cr; A-F only. Prereq–4331)
Application/integration of engineering principles to unit operations used in food production. Equipment design. Effects of processing on food quality (chemical, microbiological).

FScN 4342. Properties of Water in Foods. (4 cr. Prereq–4331)
Principles involved in processing, handling, and storage of frozen, dry and intermediate moisture biological materials (foods, drugs, biologics) with emphasis on the physio-chemical properties of water in food.

FScN 4343. Processing of Dairy Products. (4 cr. Prereq–4111, 4122, 4331)
Demonstration/application of basic concepts of food engineering/processing, food chemistry, and food microbiology to production of fluid, fermented, concentrated, and dehydrated dairy products.

FScN 4344. Technology of Fermented Dairy Products. (4 cr. Prereq–4111, 4121, 4331)
Integration of chemical, microbiological, and physical principles involved in the manufacture and storage of cheeses and fermented milks.

FScN 4345. Flavor Technology. (3 cr. Prereq–4111, 4331, ¶4121)
Flavor/off-flavor development in foods. Industrial production of food flavorings, their proper application to food systems.

FScN 4346. Functional Foods: Regulations and Technology. (3 cr; A-F only. Prereq–[4111, 4121] or [4111, 4131] or [4121, 4131])
Overview of application of regulatory principles, food science, nutritional science to development of nutraceuticals, functional foods, dietary supplements. Scientific basis, technologies, legal requirements, animal/clinical evaluation, consumer usage versus need. Review of products available in world market, with focus on the United States.

FScN 4596. Field Experience: Community Nutrition. (3 cr; A-F only. Prereq–Admitted to first year Coordinated Program in Dietetics, #)
Application of nutrition knowledge in the solution of problems related to health promotion. Assigned readings, discussion, and experiences in community agencies.

FScN 4612. Human Nutrition. (3 cr. Prereq–1112, Chem 1022, Phsl 3051)
Advanced study of digestion/absorption of nutrients. Research techniques in nutrition, including human/epidemiological studies. Health promotion, disease prevention theories.

FScN 4613. Experimental Nutrition. (2 cr. Prereq–4612, BioC 3021, Stat 3011)
Lab in chemical/biochemical methods of analysis of nutritional status.

FScN 4614. Community Nutrition. (3 cr. Prereq–1112)
Community-based nutrition issues are explored including nutrition risks associated with different age, sex, ethnic, and socioeconomic groups; community needs assessment; program planning and evaluation, and programs that address the needs and interests of people in different stages of the life cycle, ethnic or cultural backgrounds, and literacy levels.

FScN 4665. Medical Nutrition Therapy I. (3 cr; A-F only. Prereq–4612, Phsl 3051, BioC 3021)
Nutrition assessment and support. Pathology, management, and nutrition therapy for disorders of the gastrointestinal, immune, and respiratory systems, and cancer.

FScN 4666. Medical Nutrition Therapy II. (3 cr; A-F only. Prereq–4665)
Pathology, management, and nutrition therapy for disorders of the cardiovascular, endocrine, urinary, and neuromuscular and skeletal systems. Nutrition intervention for inborn errors of metabolism, and eating disorders and obesity.

For definitions of course numbers, symbols, and abbreviations, see page 296.

FScN 4696. Field Experience: Medical Nutrition Therapy I. (6 cr; A-F only. Prereq–Second year students in Coordinated Program in Dietetics or #)
Application of nutrition knowledge in the solution of problems related to disease and injury; assigned readings, discussions, and experience in medical centers and long-term care facilities. Emphasis on nutrition support; gastrointestinal, immune and respiratory disorders, and cancer.

FScN 4732. Food and Nutrition Management. (3 cr; A-F only. Prereq–3732, Mgmt 3001)
Financial and human resource management applied to a variety of business and institutional settings. Field trips may be required.

FScN 4796. Field Experience in Food and Nutrition Management. (3 cr; A-F only. Prereq–Second year students in Coordinated Program in Dietetics or #)
Application of principles of food service management to problems in community, commercial, or health care facilities.

FScN 4896. Field Experience: Medical Nutrition Therapy II. (3 cr; A-F only. Prereq–[4696, admitted to Coordinated Program in Dietetics] or #)
Application of nutrition knowledge to problems related to health/disease. Readings, discussions, experience in medical centers. Emphasizes cardiovascular, endocrine, urinary tract, energy imbalance; eating disorders.

FScN 4996. Field Experience: Medical Nutrition Therapy III. (2 cr; A-F only. Prereq–[4896, Admitted to Coordinated Program in Dietetics] or #)
Application of nutrition knowledge to problems related to health/disease, clinical management experience in medical centers. Emphasizes pediatrics, home health care, staff relief.

FScN 5411. Food Biotechnology. (2 cr. Prereq–4121)
Genetic tools as applied to food biotechnology. Improvement of microbes used in food production by modern biotechnological approaches. Discuss need for stringent regulation of modern biotechnology as well as ethical and legal issues.

FScN 5421. Introduction to Food Law. (3 cr. Prereq–1102)
Analysis of the federal legal requirements affecting the production processing, packaging, marketing, and distribution of food and food products using case law studies and regulatory history.

FScN 5431. Physiochemistry of Food. (2 cr. Prereq–4111)
Surface phenomena, colloidal interactions, liquid dispersions, gels, emulsions and foams, and functionality of food macromolecules in these systems.

FScN 5441. Introduction to New Product Development. (2 cr. Prereq–4111, 4331)
Interactive course that introduces students to the principles of new product development, from identification and testing of new product concepts, through prototype testing, to basic process design using examples from industry.

FScN 5451. Structure and Function in Foods: Quantitative Analysis. (2 cr. Prereq–4312)
Introduction to various procedures for analysis of structure and organization in raw and processed food.

FScN 5461. Food Packaging. (2 cr. Prereq–1102, 3102, Phys 1102 or Phys 1302)
Materials, principles, and procedures of packaging as they apply to food products. Emphasis is on consumer products, but the principles also apply to bulk and institutional foods and ingredients.

FScN 5471. Advanced Food Chemistry. (3 cr. Prereq–4111)
Chemical reactions taking place in formation, stability, and degradation of important food constituents. Examples of reactions for major chemical changes occurring in food systems.

FScN 5481. Sensory Evaluation of Food Quality. (2 cr; A-F only. Prereq–3102, Stat 3011)
Fundamentals of sensory perception. Test designs and methods used in studying sensory qualities of foods. Current issues in sensory evaluation. Group research project.

FScN 5511. Meat, Poultry, and Seafood Protein Processing. (2 cr. Prereq–1102, Chem 2302)
Industrial processing of meat, poultry, and seafood products with emphasis on protein systems: comminuted products, nutraceutical products, thermal processing optimization, pasteurization, least cost analysis, and color stability.

FScN 5531. Grains: Introduction to Cereal Chemistry and Technology. (2 cr. Prereq–Biol 1009, Chem 1022)
Origins, structure, biochemistry, and cellular properties of major cereal grains as they relate to primary processing (milling) and secondary processing (production of cereal products).

FScN 5621W. Nutrition and Metabolism. (4 cr. Prereq–4612, BioC 3021, Phsl 3051)
Carbohydrate, lipid, and protein metabolism. Uses "systems" or "holistic" approach to emphasize how metabolic pathways interrelate.

FScN 5622. Vitamin and Mineral Biochemistry. (3 cr. Prereq–4612, BioC 3021, Phsl 3051)
Nutritional, biochemical, and physiological aspects of vitamins/essential minerals in human/experimental-animal models.

FScN 5623. Regulation of Energy Balance. (2 cr. Prereq–5621 or ¶5621)
Regulation of energy balance in humans, including regulation of food intake and of energy expenditure.

FScN 5631. Dietary Supplements: Regulatory, Scientific, and Cultural Perspectives. (3 cr)
Concepts/principles of dietary supplements-RDA, dose-response, risk assessment. Laws/regulations, their interpretation concerning dietary supplements. Vitamins/minerals. Philosophy/use of botanicals/nutraceuticals in Western medicine in contrast to other cultures. Use of herbal supplements in Western medicine.

Forest Resources (FR)

Department of Forest Resources

College of Natural Resources

FR 1001. Orientation and Information Systems. (1 cr; A-F only)
Forest resources, recreation resource management, urban forestry programs. Forestry and natural resource careers. Qualification requirements for government positions, competencies, internships, and experiences to compete for jobs in industry. Course planning, mentoring, alumni contacts. Leadership, organization, process. Lab equipment/software, GUIs, the Internet, spreadsheets, Lumina, periodical indexes.

FR 1101. Dendrology: Identifying Forest Trees and Shrubs. (3 cr)
Identification nomenclature, classification, and distribution of common/important forest trees/shrubs. Use of keys. Field/lab methods of identification.

FR 2101. Identifying Forest Plants. (1 cr; A-F only. Prereq–[Biol 1001 or Biol 1009], Biol 2022)
Field identification of common north woods trees, shrubs, and nonwoody vascular plants. Emphasizes concept of plant communities, soil site relationships, and wildlife values. Taught at Cloquet Forestry Center.

FR 2102. Northern Forests Field Ecology. (2 cr; A-F only. Prereq–[Biol 1001 or Biol 1009], [Chem 1011 or Chem 1021])
Field examination of natural history of northern/boreal forests with respect to soils, ecological characteristics of trees, community-environment relationships, stand development, succession, and regeneration ecology. Taught at Cloquet Forestry Center.

FR 2104. Measuring Forest Resources. (1 cr; A-F only)
Introduction to land survey, tree/forest stand measurement (mensuration), and forest sampling techniques. Taught at Cloquet Forestry Center.

FR 3104. Forest Ecology. (4 cr; A-F only. Prereq–Two biol courses, chem course, knowledge of [basic botany, plant biology])
Form/function of forests as ecological systems. Characteristics/dynamics of species, populations, communities, landscapes, and ecosystem processes. Examples applying ecology to forest management. Weekly discussions focus on research topics in forest ecology, exercises applying course concepts, and current issues in forest resource management. Required weekend field trip.

FR 3114. Hydrology and Watershed Management. (3 cr. Prereq–[Biol 1009, Chem 1001, Phys 1001] or #)
Introduction to hydrologic cycle and water processes in upland/riparian systems. Applications of hydrological concepts to evaluate impacts of forest management and other land use patterns/activities on water yield, stormflow, erosion, sedimentation, and water quality. Concepts, principles, and applications of riparian/watershed management. Economic/social factors. Uses national/global examples. Emphasizes forest ecosystems.

FR 3131. Geographical Information Systems (GIS) for Natural Resources. (4 cr; A-F only. Prereq–Jr)
Introduction to GIS. Focuses natural resources. Data structures, sources, collection, and quality. Lab exercises introduce geodesy, map projections, spatial analyses, and cartographic modeling.

FR 3203. Forest Fire and Disturbance Ecology. (3 cr; A-F only. Prereq–3104 or equiv)
Ecology, history, management, and control of fire, wind, insect infestation, browsing, and other disturbances in forests. Disturbance regimes of boreal, northern hardwood, and other major forest types of North America. Influence of disturbance on wildlife habitat, urban/wildland interfaces, forest management, and stand/landscape dynamics. Guest speakers on fire organization, training, and operations. Two-day field trip.

FR 3218. Measuring and Modeling Forests. (3 cr; A-F only. Prereq–[Math 1142 or [Math 1271, Math 1272]], Stat 3011)
General sampling design and survey techniques to assess current resource conditions. Application of metrics/sampling methods to forest vegetation. Calculation of tree/stand volume. Selection of modeling approaches. Case studies of modeling to project future growth. Landscape processes, characterization, modeling.

FR 3251. Natural Resources in Sustainable International Development. (3 cr; A-F only)
International perspectives on resource use in developing countries. Integration of natural resource issues with social, economic, and policy considerations. Overviews of agriculture, forestry, agroforestry, non-timber forest products, water resources, certification, and development issues. Latin American case studies.

FR 3262. Remote Sensing of Natural Resources and Environment. (4 cr)
Principles/techniques of remote sensing and its applications to mapping/monitoring land/water resources from local to global scales. Forest and natural resource inventory. Forest cover and soil mapping. Land use/global change analysis. Lab provides hands-on experience working with aerial photography and digital sensing imagery.

FR 3411. Silviculture: Managing Forest Ecosystems. (4 cr. Prereq–3104 or #)
Introduction to management of forest stands, habitats, and ecosystems in a landscape context. Philosophical approaches, silvicultural systems, methods/tools for reforestation, restoration techniques. Intermediate stand treatments. Ramifications of management choices on quality, production, wildlife habitat, disturbance potential, aesthetics, old-growth development, and forest health. Lab. Weekend field trip required.

FR 3431. Timber Harvesting and Road Planning. (2 cr. Prereq–3411 or #)
Introduction to forest operations. Terminology, basic engineering, equipment and harvesting system options, productivity/costs. Relationship to forest

management and silviculture. Road planning, forest management guidelines, approaches for mitigating potential impacts to soil/water resources. Environmental implications of method/equipment choices. Selling timber. Sale design, layout, and administration. Two all-day field trips.

FR 3471. Forest Planning and Management. (3 cr; A-F only. Prereq–[3218, NRES 3261] or #)
Processes/techniques for scheduling forest management activities. Goals of landowners, industry, government, and society. Predicting forest outcomes, financial analysis, forest regulation, mathematical models, linear programming, economic analysis. Landscape-level management, desired conditions, historical range of variability, wildlife management, carbon sequestration, resource monitoring, certification, adaptive management.

FR 3480. Topics in Natural Resources. (1-3 cr [max 12 cr]. Prereq–#)
Lectures in special fields of natural resources given by visiting scholar or regular staff member. Topics specified in *Class Schedule.*

FR 3501. Arboriculture: Selection and Maintenance of Trees. (3 cr. Prereq–[1101 or Hort 1012], Biol 2022)
Selection, growth, propagation, and maintenance of trees for urban spaces. Tree selection, site preparation, plant health care management. Prevention, diagnosis, and remediation of urban tree risks such as insects, pathogens, pollution, development, and climate change.

FR 3550. Off-Campus Study. (0 cr [max 30 cr]; S-N only. Prereq–#)

FR 4118. Physiological Ecology of Woody Plants. (3 cr; A-F only. Prereq–One chemistry course, one biology course, one ecology course)
Plant-water relations. Relations of biology to ecology/management. How physiological factors affect ecological processes and management decisions.

FR 4200H. Honors Seminar. (1 cr; A-F only. Prereq–FR upper div honors, #)
Current topics presented by faculty/students. Lectures. Discussions.

FR 4293. Directed Study. (1-5 cr [max 15 cr]. Prereq–#)
Study/project on topic of personal interest in consultation with faculty member. Initial proposal, reports of accomplishments.

FR 4501. Urban Forest Management: Managing Greenspaces for People. (3 cr. Prereq–[1101, 3501, Ent 4251, PlPa 3003, UF major] or #)
Management concepts for green infrastructure of cities, towns, and communities. Urban forest as a social/biological resource. Emphasizes management of urban forest ecosystem to maximize benefits to people. Tree selection, risk assessment, cost-benefit analysis, landscape planning, values, perceptions. How urban forestry can be a tool to improve community infrastructure.

FR 4801H. Honors Research. (2 cr; A-F only. Prereq–FR upper div honors, #)
First semester of independent research project supervised by faculty member.

FR 4802H. Honors Research. (2 cr; A-F only. Prereq–FR upper div honors, #)
Honors thesis. Oral report.

FR 5104. Forest Ecology. (4 cr; A-F only. Prereq–[Knowledge of basic [botany, plant biology], grad student] or #)
Form/function of forests as ecological systems. Characteristics/dynamics of species, populations, communities, landscapes, and ecosystem processes. Examples applying ecology to forest management. Weekly discussions on research topics, exercises, current issues in forest resource management. Required weekend field trip.

FR 5114. Hydrology and Watershed Management. (3 cr. Prereq–Grad student or #)
Introduction to hydrologic cycle and water processes in upland/riparian systems. Applications of hydrological concepts to evaluate impacts of forest management and other land use patterns/activities on water yield, stormflow, erosion, sedimentation, and water quality. Concepts, principles, and applications of riparian/watershed management. Economic/social factors. National/global examples. Emphasizes forest ecosystems.

FR 5118. Physiological Ecology of Woody Plants. (3 cr; A-F only. Prereq–Grad student or #)
Plant-water relations. Relations of biology to ecology and management. How physiological factors affect ecological processes and management decisions.

FR 5131. Geographical Information Systems for Natural Resources. (4 cr; A-F only. Prereq–Grad student or #)
Introduction to GIS. Focuses on natural resources. Data structures, sources, collection, and quality. Lab exercises introduce geodesy, map projections, spatial analyses, and cartographic modeling.

FR 5142. Tropical Forest Ecology. (3 cr. Prereq–3xxx ecology course)
Ecological principles related to form, function, and development of wet/dry tropical forests at organismal, community, and ecosystem scales. Ecophysiology, succession, productivity, biodiversity, sustainability, agroforestry, social forestry, and management alternatives. Natural distribution of forest types. Causes, consequences, and extent of deforestation.

FR 5146. Biological Implications of Global Change. (3 cr. Prereq–3xxx ecology course)
Implications of global change for wild/cultivated vegetation. Forests, grasslands, agricultural ecosystems. Responses at scales from immediate organismal physiological responses through changes in communities to ecosystem shifts on a geologic times scale. Potential for climate change. Atmospheric concentrations of carbon dioxide, ozone, and other trace gasses. Impacts of acid deposition and other pollutant issues.

FR 5153. Forest and Wetland Hydrology. (3 cr. Prereq–Basic hydrology course or #)
Field identification of common trees, shrubs, and nonwoody vascular plants. Plant communities, soil site relationships, wildlife values. Natural history of northern/boreal forests in terms of soils, ecological characteristics of trees, community-environment relationships, stand development, succession, and regeneration ecology. Land survey, tree/forest stand measurement, forest sampling techniques. Taught at Cloquet Forestry Center.

FR 5161. Northern Forest Field Course. (2 cr; A-F only. Prereq–#)
Field identification of common trees, shrubs, and nonwoody vascular plants. Plant communities, soil site relationships, wildlife values. Natural history of northern/boreal forests in terms of soils, ecological characteristics of trees, community-environment relationships, stand development, succession, and regeneration ecology. Land survey, tree/forest stand measurement, forest sampling techniques. Taught at Cloquet Forestry Center.

FR 5203. Forest Fire and Disturbance Ecology. (3 cr; A-F only. Prereq–3104 or equiv)
Ecology, history, management, and control of fire, wind, insect infestation, browsing, and other disturbances in forests. Disturbance regimes of boreal, northern hardwood, and other major forest types of North America. Influence of disturbance on wildlife habitat, urban/wildland interfaces, forest management, and stand/landscape dynamics. Guest speakers on fire organization, training, and operations. Two-day field trip.

FR 5218. Measuring and Modeling Forests. (3 cr; A-F only. Prereq–Grad student or #)
General sampling design and survey techniques to assess current resource conditions. Application of metrics/sampling methods to forest vegetation. Calculation of tree/stand volume, selection of modeling approaches. Case studies of modeling to project future growth. Landscape processes, characterization, and modeling.

FR 5228. Advanced Assessment and Modeling. (3 cr; A-F only. Prereq–3218, Math 1272, Stat 5021)
Application of recently developed mathematics, computer science, and statistics methodologies to natural resource functioning, management, and use problems. Specific topics, software, and methodologies vary.

FR 5232. Managing Recreational Lands. (4 cr; A-F only. Prereq–Grad student or #)
Recreation management tools from a public agency perspective. Social carrying capacity, recreation opportunity spectrum, limits of acceptable change, benefits based management, visitor experience/resource protection. Various projects. Group project to develop a management plan.

FR 5251. Natural Resources in Sustainable International Development. (3 cr; A-F only. Prereq–Grad student or #)
International perspectives on resource use in developing countries. Integration of natural resource issues with social, economic, and policy considerations. Agriculture, forestry, agroforestry, non-timber forest products, water resources, certification, development issues. Latin American case studies.

FR 5262. Remote Sensing of Natural Resources and Environment. (4 cr. Prereq–Grad student or #)
Principles/techniques of remote sensing. Mapping/monitoring land/water resources from local to global scales. Forest and natural resource inventory. Forest cover and soil mapping. Land use/global change analysis. Lab provides hands-on experience working with aerial photography and digital sensing imagery.

FR 5264. Advanced Forest Management Planning. (3 cr. Prereq–3471 or #)
Applied models for forest planning to integrate forest resource conditions/uses. Stand-level management. Forest-wide/landscape-level planning. Regional timber supply analysis. Optimization models and heuristic techniques as tools. Integrating sustainable timber production with desirable future conditions and spatial structure for biodiversity. Problems, case studies involving recent large-scale applications.

FR 5403. Teaching About Natural Resources. (1-2 cr. Prereq–NRES major or elementary teacher or #)
Forest community, tools used by natural resource managers, management practices. Natural-resource-related indoor/outdoor activities that can be translated for classroom use. One intensive weekend required.

FR 5411. Silviculture: Managing Forest Ecosystems. (4 cr. Prereq–Grad student or #)
Management of forest stands, habitats, and ecosystems in a landscape context. Philosophical approaches, silvicultural systems, methods/tools for reforestation, restoration techniques, intermediate stand treatments. Ramifications of management choices on quality, production, wildlife habitat, disturbance potential, aesthetics, old-growth development, and forest health. Lab. Weekend field trip required.

FR 5412. Digital Remote Sensing. (3 cr. Prereq–3262 or grad student or #)
Physical basis and practical applications of digital remote sensing. Energy-matter interactions. Measurements and sensors. Digital image processing/analysis. Experience working with remote sensing data, image processing, and models.

FR 5431. Timber Harvesting and Road Planning. (2 cr. Prereq–Grad student or #)
Forest operations. Terminology, engineering, equipment/harvesting system options, productivity/costs. Relationship to forest management and silviculture. Road planning, forest management guidelines. Mitigating potential impacts to soil/water resources. Environmental implications of method/equipment choices. Selling timber. Sale design, layout, and administration. Two all-day field trips.

FR 5471. Forest Planning and Management. (3 cr; A-F only. Prereq–Grad student or #)
Processes/techniques for scheduling forest management. Goals of landowners, industry, government, and society. Issues/policies/regulations

that influence management. Predicting outcomes, financial analysis, regulation, mathematical models, linear programming, economic analysis. Landscape-level management, historical range of variability, wildlife management, carbon sequestration, resource monitoring, certification, adaptive management.

FR 5480. Topics in Natural Resources. (1-3 cr [max 12 cr]. Prereq–#)
Lectures in special fields of natural resources given by visiting scholar or regular staff member. Topics specified in *Class Schedule*.

FR 5501. Urban Forest Management: Managing Greenspaces for People. (3 cr. Prereq–Grad student or #)
Management concepts for green infrastructure of cities, towns, and communities. Urban forest as social/biological resource. Emphasizes management of urban forest ecosystem to maximize benefits. Tree selection, risk assessment, cost-benefit analysis, landscape planning, values, perceptions. How urban forestry can be a tool to improve community infrastructure.

FR 5611. Field Silviculture. (3 cr. Prereq–3104, 3411)
Collection of field data to prepare/write silvicultural prescriptions for regeneration, thinning, and harvesting in context of landscape, watershed, and wildlife habitat issues. Field exercises in forest entomology, pathology, tree improvement, and non-timber forest products. Tree planting. Marking stands for harvest. Taught at Cloquet Forestry Center. Field trips to forests managed by state/industry.

FR 5615. Field Remote Sensing and Resource Survey. (2 cr; A-F only. Prereq–3218, 3262)
Field applications of remote sensing, sampling/measurement methods to inventory/mapping of forest and other natural resources. Offered at Cloquet Forestry Center.

FR 5621. Field Timber Harvesting and Road Planning. (2 cr. Prereq–[3411, 3431] or #)
Design, layout, and administration of timber sales. Forest road planning and design. Protecting residual trees during harvesting operations. Dealing with protesters. Field trips and on-site evaluations of timber harvesting systems. Timber appraisal, forest management guidelines. Road location and profiling. Planning/layout considerations. Taught at Cloquet Forestry Center.

FR 5700. Colloquium in Natural Resources. (1-3 cr. Prereq–#)
Colloquium in specialized topics in natural resources.

French (Fren)

Department of French and Italian

College of Liberal Arts

Fren 0001. Reading French in the Arts and Sciences. (0 cr; S-N only)
Basic reading knowledge of French language; intensive reading and translation of texts from a wide variety of disciplines. Students successfully completing the course obtain Language Certification in French which satisfies a Graduate School requirement.

Fren 1001. Beginning French. (5 cr)
Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings.

Fren 1002. Beginning French. (5 cr. Prereq–1001 or equiv)
Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings.

Fren 1003. Intermediate French. (5 cr. Prereq–1002 or Entrance Proficiency Test)
Development of listening, writing, and speaking skills in the context of cultural themes related to the Francophone world. Grammar review and elaboration.

Fren 1004. Intermediate French. (5 cr. Prereq–1003 or Entrance Proficiency Test)
Development of listening, reading, writing, and speaking skills in the context of cultural themes related to the Francophone world. Grammar review and elaboration.

Fren 1022. Accelerated Beginning French. (5 cr. Prereq–2 or more yrs high school French)
For students who have studied French in high school or at community colleges and who do not place high enough on placement exam to enter 1003. An accelerated review of Fren 1001 followed by the material covered in Fren 1002.

Fren 3010. French Expression. (3 cr [max 6 cr])
Intensive work in oral/written communication.

Fren 3014. French Phonetics. (2 cr. Prereq–1004)
Articulatory description of the sounds of French, phonetic transcription, and remedial practice to improve pronunciation.

Fren 3015. Advanced French Grammar and Communication. (4 cr. Prereq–1004 or equiv or #)
Advanced study of French with particular emphasis on grammar review, vocabulary building, oral communication skills, and language usage in cultural contexts.

Fren 3016. Advanced French Composition and Communication. (4 cr. Prereq–3015 or equiv or #)
Advanced study of grammar in context; emphasis on writing for varied communicative purposes, reading for style and content, translation.

Fren 3018. French Oral Communication. (3 cr. Prereq–3014, 3015)
Intensive work in oral expression, listening comprehension. Incorporates wide variety of cultural topics.

Fren 3019. French Diction and Speaking. (2 cr. Prereq–3014)
The relationship between the written and the spoken word in French. Learn to read prose and poetry aloud from a text using appropriate French pronunciation, etc. Leads to play readings and possible performance.

Fren 3022. The Language and Culture of Business in France. (3 cr. Prereq–3015; completion of 3016 recommended)
Examines French business language as well as business practices and culture in France. Includes cross-cultural analysis.

Fren 3101W. Introduction to French Literature. (4 cr. Prereq–3015 or equiv)
Close critical analysis of poetry, prose fiction, and plays. Introduction to literature and methods of literary analysis.

Fren 3111. Medieval Stories. (3 cr. Prereq–3101)
Reading/discussion of major forms of medieval tale (comic, bawdy, moralizing, fantasy, historical) in modern French translation. Explores their relationship to development of French culture, especially urbanization, class relations, marriage, role of Church.

Fren 3140. Topics in Medieval and Renaissance Literature. (3 cr [max 9 cr]. Prereq–3101)
Different aspects of French literature/culture of medieval/Renaissance periods (11th-16th century). Content varies depending on instructor. Literary, historical, or social problem. Period, author, genre, or topic of interest. Readings may be literary, critical, cultural, historical, political, etc. Specific content posted in department and in *Course Guide*.

Fren 3170. The Unruly Subject(s) of Classicism: Writing, History, Power in Ancien Régime France. (3 cr [max 9 cr]. Prereq–3101 or equiv)
The formation of subjectivity in the literature and culture of 17th- and 18th-century France. Aesthetics of classicism, consolidation of state power, and representations of the individual in theater, novel, and prose.

Fren 3172. The Court Society: Literature, Culture, Spectacle. (3 cr. Prereq–3101)
Examines the court and salon society in 17th-century France. The production of taste, sociability, and national identity is considered in literature, painting, architecture, and the plastic arts.

Fren 3181. Mapping Enlightenment in 17th- and 18th-Century French Prose. (3 cr. Prereq–3101)
The themes, values, and critical strategies of the social and intellectual movement designated by the term Enlightenment. The legacy of the Enlightenment project will also be evaluated.

Fren 3240. Topics in Ancien Regime Literature. (3 cr [max 9 cr]. Prereq–3101)
Different aspects of French literature/culture from early modern period (17th/18th centuries). Content varies depending on instructor. Literary, historical, or social problem. Period, author, genre or topic of interest. Readings may be literary, critical, cultural, historical, political, etc. Specific content posted in department and in *Course Guide*.

Fren 3250. French Poetry. (3 cr [max 9 cr]. Prereq–3101)
The historical, political, and social contexts of the evolution of French poetry from its origins to the modern era. While studying primarily lyric poetry, epic and dramatic poetry may also be considered when appropriate.

Fren 3260. Dramas of Culture: 20th-Century French and Francophone Theater. (3 cr [max 9 cr]. Prereq–3101)
Key movements, dramatists, and contexts of 20th-century French and Francophone theater. Areas of study include naturalist and symbolist legacies as well as existentialist, avant-garde, and contemporary performance and drama.

Fren 3280. The Indispensables: French Texts to 1789. (3 cr [max 9 cr]. Prereq–3101)
Exposes students to some essential works in French which were characteristic in their time or influential later. Works of all genres will be read. The actual works read will differ according to instructor preference. Taught in French.

Fren 3310. Literature of Revolution and Upheaval. (3 cr [max 9 cr]. Prereq–3101)
A study of revolutionary movements in France seen through novels placed in historical context. Content may vary, but course will deal with radical historical, cultural and literary changes in France primarily in the modern period.

Fren 3321. Producing the Bourgeois Subject: The Sense of Self in 18th-Century French Literature. (3 cr. Prereq–3101)
Examines the role of 18th-century literature in shaping the notion of self and social identity. Attention is given to the novel and its relation to new reading practices and publics.

Fren 3330. Literature and the Making of Modern France: 20th-Century Perspectives. (3 cr [max 9 cr]. Prereq–3101)
Developments of literary culture of 20th-century France in the context of historical events and social transformations.

Fren 3340. Topics in Modern French Literature. (3 cr [max 9 cr]. Prereq–3101)
Different aspects of modern French literature/culture, defining modern period as that of post-Revolution France. Content varies depending on instructor. Literary, historical, or social problem. Period, author, genre, or topic of interest. Readings may be literary, critical, cultural, historical, political, etc. Specific content posted in department and in *Course Guide*.

Fren 3350. Topics in Literature. (3 cr [max 9 cr])
Focuses on a problem, period, author, or topic of interest. Specific content posted in department and listed in *Course Guide*.

Fren 3360. Coming of Age. (3 cr [max 9 cr]. Prereq–3101)
A study of the literature of education and of the process of youth coming to terms with society. Readings will vary and will be drawn from a number of time periods.

Fren 3370. Legal Issues in French Novels Since the Revolution. (3 cr [max 9 cr]. Prereq–3101)
The importance of legal issues in French novels. Analyze the impact of lawyers, judges, witnesses, the police, etc. on individuals and interpersonal relationships. Examine how novelists short-circuit the legal system and create alternative ways of settling disputes.

Fren 3371. Writing Crisis in (Post) Modern Times. (3 cr. Prereq–3101)
Examines the meaning and purpose of the notion of crisis in French novels. How crises, be they personal, social or political, prompt writers to create new modes of (dis)connecting with other persons, institutions, and society.

Fren 3380. Modern Times: Literature of the 19th and 20th Centuries. (3 cr [max 9 cr]. Prereq–3101)
Variously emphasizing the two centuries. Sample topics include: esthetic currents (Realism and the novel); cultural considerations (gendered representations); philosophical concerns (the relation of individuals to the social body in civil society).

Fren 3410. Québécois Literature. (3 cr [max 9 cr]. Prereq–3101)
Study writing produced in Quebec as a literature of its own, not simply as a part of Canadian literature. Literature will be studied in relation to other North American literatures and to Francophone literature produced elsewhere in the world.

Fren 3479. Francophone Writers of the African Diaspora. (3 cr. Prereq–3101)
Literature from Francophone North Africa, Africa, the Caribbean of the colonial and/or post-colonial eras, examined in its historical, cultural, or ideological contexts. Reading selections may include texts by immigrant or exiled writers in France.

Fren 3501. Structure of French: Phonology. (3 cr. §5501. Prereq–3014, 3015, Ling 3001 or #)
Advanced study of the sound system of contemporary French.

Fren 3502. Structure of French: Morphology and Syntax. (3 cr. §5502. Prereq–3501, Ling 3001 or #)
Linguistic study of contemporary French word forms (inflectional and derivational morphology); introduction to French syntax (linguistic study of grammar) and characteristic syntactic constructions.

Fren 3521. History of the French Language. (3 cr. Prereq–3015, Ling 3001 recommended)
Origins and development of the French language from Latin to contemporary French. Selected texts. Present stage and development.

Fren 3531. Sociolinguistics of French. (3 cr. §5531. Prereq–3015, Ling 3001 or #)
Explores variation in the use of French associated with factors such as medium (oral/written), style (formal/informal), region, social and economic groups.

Fren 3601. French Civilization and Culture I. (3 cr. Prereq–3015)
Roman occupation of Gaul to 1715.

Fren 3602. French Civilization and Culture II. (3 cr. Prereq–3015)
1705 to present.

Fren 3650. Topics in French/Francophone Cultures. (3 cr [max 9 cr]. Prereq–3015)
Focus on aspects of French and/or francophone cultures in various historical, social, political, and geographical contexts.

Fren 3705. Atlantic Crossings: The French View Americans (and Vice Versa). (3 cr. Prereq–Not for majors)
French perspectives on the United States and American perspectives on France in "travel" literature and film examined in their historical, political, and cultural contexts. Taught in English. Knowledge of French helpful but not necessary.

Fren 3706. Quebec: Literature and Film in Translation. (3 cr. Prereq–Not for major)
A survey of Quebec literature and film in English or with subtitles. Particular attention paid to cultural tensions as well as to the impact of women writers and filmmakers on each genre.

Fren 3710. Reading Libertinage: Dangerous Lessons in Translation. (3 cr [max 9 cr]. Prereq–Not for majors)
Designed for non-majors, this course examines libertinage and the libertine in French literature of the 17th and 18th centuries. Literary forms will be examined as ways to produce and question desire. Taught in English; all readings in English.

Fren 3750. Topics in French/Francophone Literature and Culture. (3 cr [max 9 cr]. Prereq–Non-French major; knowledge of French helpful)
Theme, problem, period, or topic of interest in French or Francophone literature or culture. See *Class Schedule.* Taught in English.

Fren 3995. Directed Teaching. (1-5 cr [max 25 cr]; S-N only. Prereq–Δ)
Directed teaching.

Fren 4101W. Seminar in French Studies. (3 cr. Prereq–Completion of all pre-elective requirements for major or permission of DUS.)
Reading and discussion of contemporary issues in French studies and workshop on senior projects.

Fren 4510. Topics in French Linguistics. (3 cr [max 9 cr]. Prereq–3015 or equiv; 3016 recommended)
Topics selected from French syntax, pragmatics, discourse analysis, or sociolinguistics.

Fren 4970. Directed Readings. (1-4 cr [max 9 cr]. Prereq–#)
Designed to meet unique requirements agreed upon by a faculty member and a student. Individual contracts are drawn up listing contact hours, number of credits, written and other work required. Each contract will vary.

Fren 5250. Promenades Poétiques: The Subject in Motion. (3 cr [max 9 cr]. Prereq–3111 or above)
The search for the subject in poetry and poetic prose as revealed through the motif of the "promenade" and experimentation with literary forms.

Fren 5260. The Returns of Tragedy. (3 cr [max 9 cr]. Prereq–3111 or above)
Tragedy as dramatic form in relation to social order, myth and history, and theatre.

Fren 5270. "To Change or not to Change?": Speculations on (Post) Modern French Texts. (3 cr [max 9 cr]. Prereq–3111)
The meaning and purpose of the notion of "change" in French novels. Explore how a multiplicity of causes produces major changes in an individual's personal and public life. The notion of change as it relates to financial and intellectual speculation.

Fren 5301. Critical Issues in French Studies. (3 cr. Prereq–# for undergrads)
Introduces the methods of interpretation and critical debates that have shaped and continue to define the discipline of French studies. Provides a practical introduction to graduate-level literary research.

Fren 5350. Topics in Literature and Culture. (3 cr [max 12 cr]. Prereq–3101 or equiv)
Problem, period, author, or topic of interest. See *Class Schedule.*

Fren 5470. Post/Colonial Francophone Literatures. (3 cr [max 9 cr]. Prereq–3111 or above)
Francophone literature from North Africa, Africa, and the Caribbean of the colonial and/or post-colonial eras in the light of relevant literary and cultural theories.

Fren 5501. Structure of French: Phonology. (3 cr. §3501. Prereq–[Ling 3001 or Ling 5001], grad student)
Advanced study of sound system of contemporary French.

Fren 5502. Structure of French: Morphology and Syntax. (3 cr. §3502. Prereq–5501 or #)
Linguistic study of contemporary French word forms (inflectional and derivational morphology); introduction to French syntax (linguistic study of grammar) and characteristic syntactic constructions.

Fren 5531. Sociolinguistics of French. (3 cr. §3531. Prereq–Ling 3001 or 5001, grad)
Explores variation in the use of French associated with factors such as medium (oral/written), style (formal/informal), region, social and economic groups.

Fren 5995. Directed Teaching. (1-6 cr [max 24 cr]; S-N only. Prereq–#)
Directed teaching.

French and Italian (FrIt)

Department of French and Italian

College of Liberal Arts

FrIt 3802. Cinema and Realism. (3 cr)
Examines French poetic realism, relating it to two other periods of realist film, Italian Neorealism and American film noir. Taught in English. Knowledge of French helpful but not necessary.

FrIt 3803. New Wave Cinemas: Love, Alienation and Landscape in Post-War Italian and French Film. (3 cr)
Modernist Italian and New Wave French cinema after WWII, focusing on film syntax, constructions of gender, and the individual's relationship to the modern urban and rural landscape. Taught in English. Knowledge of Italian and French helpful but not necessary.

FrIt 3804. Cinema and Culture: The City of Paris. (3 cr)
How French cinema, from the silent era to the present, reflects and constructs the pleasures and anxieties of urbanization, new modes of entertainment, and new cultural roles for men and women. Taught in English. Knowledge of Italian and French helpful but not necessary.

FrIt 3850. Topics in French and Italian Cinema. (3 cr [max 9 cr]. Prereq–Knowledge of [French or Italian] helpful but not required)
Theme, problem, period, filmmaker, or topic of interest in French/Italian cinema. See *Class Schedule.* Taught in English.

FrIt 5257. Passionate Beings: Literary and Medical Problematics in Italy and France from 1800 to the Present. (4 cr)
Literary and medical representations of the passions in France and in Italy from 1800 to the present. Texts range from theatrical works to medical treatises on the passions as ways for exploring notions of subjectivity, responsibility, order. Taught in English.

FrIt 5850. Topics in French and Italian Cinema. (3 cr [max 9 cr]. Prereq–Knowledge of [French or Italian] helpful but not required)
Focuses on a theme, problem, period, filmmaker, or other topic of interest in French or Italian cinema. See *Class Schedule.* Taught in English.

FrIt 5999. Teaching of French and Italian: Theory and Practice. (3 cr)
Theoretical and practical aspects of language learning and teaching applied to French and Italian. Includes history of foreign language teaching in 20th-century United States. Taught in English.

General College (GC)

General College

GC 0623. Geometry: Programmed Study. (0 cr. Prereq–[4 cr equiv]; [0721 or GC math placement], #)
Basic geometric concepts/logic. Measurement, angles, polygons, plane geometric figures, three-dimensional figures, relationships among angles, constructions. Programmed study: students complete course requirements in time frame established by instructor.

GC 0643. Mathematics: Programmed Study. (0 cr. Prereq–[4 cr equiv]; #)
Basic mathematics, elementary algebra, or intermediate algebra for students who need to learn math at their own pace. Instructor assigns topics for each student based on first-day pretest.

For definitions of course numbers, symbols, and abbreviations, see page 296.

GC 0712. Introductory Algebra, Part I. (0 cr. §0616, §0621, §0716, §0721, §0722, §1435. Prereq–[4 cr equiv]; GC math placement)
Traditional lecture/discussion course with group work. Covers first half of content of a first course in algebra at level of difficulty geared for students at a research university. Arithmetic review, real number operations, expressions, equations, inequalities, rectangular (x-y) graphs.

GC 0713. Introductory Algebra, Part II. (0 cr. §0616, §0617, §0621, §0717, §0721, §0722, §1435. Prereq–[4 cr equiv]; 0712, 0716, #)
Traditional lecture/discussion course with group work. Covers second half of content of a first course in algebra at level of difficulty geared for students at a research university. Graphing review, linear systems, word problems, exponents, polynomials, factoring.

GC 0716. Introductory Algebra, Part I: Computer. (0 cr. §0616, §0621, §0712, §0721, §0722, §1435. Prereq–[4 cr equiv]; GC math placement)
Students learn via multimedia software. Instructor helps students individually during class. No lectures. Covers first half of content of a first course in algebra at level of difficulty geared for students at a research university. Arithmetic review, real number operations, expressions, equations, inequalities, rectangular (x-y) graphs.

GC 0717. Introductory Algebra, Part II (Computer). (0 cr. §0616, §0617, §0621, §0713, §0721, §0722, §1435. Prereq–[4 cr equiv]; 0712, 0716, #)
Students learn via multimedia software. Instructor helps students individually during class. No lectures. Covers second half of content of a first course in algebra at level of difficulty geared for students at a research university. Graphing review, linear systems, word problems, exponents, polynomials, factoring.

GC 0721. Introductory Algebra. (0 cr. §0616, §0617, §0621, §0712, §0713, §0716, §0717, §0722, §1435. Prereq–[4 cr equiv]; GC math placement)
Traditional lecture/discussion course with group work. Covers content of a first course in algebra at level of difficulty geared for students at a research university. Real number operations, expressions, equations, inequalities, rectangular (x-y) graphs, linear systems, word problems, exponents, polynomials, factoring.

GC 0722. Introductory Algebra (Computer). (0 cr. §0616, §0617, §0621, §0712, §0713, §0716, §0717, §0721, §1435. Prereq–[4 cr equiv]; GC math placement)
Students learn via multimedia software. Instructor helps students individually during class. No lectures. Covers content of a first course in algebra at level of difficulty geared for students at a research university. Real numbers, expressions, equations, inequalities, rectangular graphs, systems, word problems, exponents, polynomials, factoring.

GC 0731. Intermediate Algebra. (0 cr. §0618, §0625, §0631, §0732, §1443, §1444, §1445, §1446. Prereq–[4 cr equiv]; grade of at least C in [0713 or 0717 or 0721 or 0722] or GC math placement)
Traditional lecture/discussion course. Covers content of a second course in algebra at level of difficulty geared for students at a research university. Rational expressions, absolute value, roots, radicals, quadratic, exponential, and logarithmic functions, complex numbers.

GC 0732. Intermediate Algebra (Computer). (0 cr. §0618, §0625, §0631, §0731, §1443, §1444, §1445, §1446. Prereq–[4 cr equiv]; grade of at least C in [0713 or 0717 or 0721 or 0722] or GC math placement)
Students learn via multimedia software. Instructor helps students individually during class. No lectures. Covers content of a second course in algebra at level of difficulty geared for students at a research university. Rational expressions, absolute value, roots, radicals, quadratic, exponential, and logarithmic functions, complex numbers.

GC 1041. Developing College Reading. (2 cr [max 6 cr]. Prereq–Non-native speaker of English, CE enrollment, #)
Comprehension/study strategies for reading college-level textbooks. Previewing a textbook for content/organization. Underlining and making margin notes. Outlining, anticipating test questions, and interpreting technical vocabulary. Paired with a designated content course.

GC 1042. Reading in the Content Area. (2 cr [max 6 cr]. Prereq–Non-native speaker of English, CE enrollment, #)
Reading skills/strategies for a content area. Previewing/predicting content/organization. Note taking, outlining, anticipating test questions, and interpreting technical/sub-technical vocabulary. Paired with designated content course.

GC 1051. Introduction to College Writing: Workshop. (2 cr. §1407. Prereq–[¶1421 or ¶1422], non-native speaker of English)
Language editing strategies. Review of linguistic features of standard written English. Style/language in writing. Small-group activities. In-group or individual conferences.

GC 1076. Career Planning Strategies. (2 cr)
Major issues in career/major planning. Self-understanding/management, importance of human relations in career success. Capitalizing on one's education, experiences, and talents during job search.

GC 1081. Academic Development Seminar: Supplemental Instruction in Social Sciences. (1 cr; A-F only. Prereq–[1081 or 1085], ¶[specific content course], adviser approval)
Methods of study in social science courses. Note taking, exam preparation, and time management. Specific writing tasks, critical thinking, research methods, essay/presentation styles associated with disciplinary content.

GC 1082. Academic Development Seminar: Supplemental Instruction in the Sciences. (1 cr; A-F only. Prereq–[1081 or 1085], ¶[specific content course], adviser approval)
Methods of study in science courses. Note taking, exam preparation, time management. Specific problem solving techniques, augmented problem sets, writing tasks, presentation styles associated with disciplinary content.

GC 1083. Academic Development Seminar: Supplemental Instruction in the Humanities. (1 cr; A-F only. Prereq–[1081 or 1085], ¶[specific content course], adviser approval)
Methods of study in humanities courses. Note taking, exam preparation, time management. Specific writing tasks, critical thinking skills, research methods, essay/presentation styles associated with disciplinary content.

GC 1084. Academic Development Seminar: Supplemental Instruction in Mathematics. (1 cr; A-F only. Prereq–[1081 or 1085], ¶[specific content course], adviser approval)
Methods of study in mathematics courses. Note taking, exam preparation, time management. Necessary math background, specific problem-solving techniques, application of mathematical concepts associated with disciplinary content.

GC 1085. Academic Development Seminar: Supplemental Instruction in Composition. (1 cr; A-F only. Prereq–[1081 or 1085], ¶[specific content course], adviser approval)
Methods of study in composition courses. Note taking, exam preparation, time management. Specific writing tasks, research methods, essay/presentation styles associated with disciplinary content.

GC 1086. Freshman Seminar. (2 cr; A-F only)
Awareness of roles, identity, needs, and interactions with diverse groups. Expectations, resources, and challenges associated with transition into college. Speakers, journals/portfolios, technology, reading/writing assignments, classroom exercises/experiences.

GC 1111. Science in Context: Weather and Climate. (4 cr)
Scientific principles/concepts applied in context of the atmosphere and its weather/climate. How familiar types of weather happen. Forecasting weather. Predicting regional climates. Lecture, lab.

GC 1112W. Ecological Evaluation of Environmental Problems. (3 cr)
Relating ecological concepts (energy flow, material cycling) to causes/effects of environmental problems (world hunger, toxic waste, global warming, acid rain). Methods of evaluating cultural practices' impact on the environment. Critical evaluation of potential interventions.

GC 1131. Principles of Biological Science. (4 cr)
Biodiversity/classification, genetics, evolution, ecology, life cycles/reproduction, cell theory, chemical bases for life from a "how-we-know" perspective, relevancy to modern life. Inquiry-based, collaborative lab.

GC 1132. Essentials of Human Anatomy and Physiology. (3 cr)
Health/disease examined by organ system (e.g., urinary, reproductive). Access to lecture material/activities via the Internet. No lab.

GC 1133. Nature Study. (3 cr)
Natural history for students with little or no training in biology. Minnesota plants/animals examined in field from viewpoint of informed amateur naturalist. Life cycles and natural habitat associations. Field observation and identification techniques. Popular/scientific literature.

GC 1135. Human Anatomy and Physiology. (4 cr)
Health/disease examined by organ systems (e.g., urinary, reproductive). Access to instructional material/activities via Internet. Lecture/lab.

GC 1161. Solar System Astronomy. (4 cr)
Planets, satellites, asteroids, comets, and meteorites. The celestial sphere, coordinate systems, time intervals, motions, and physical attributes of planets and of their satellites. Instruments used by astronomers and by space probes.

GC 1162. Stellar Astronomy. (4 cr)
Large-scale structure of universe. Definition of magnitude, luminosity, brightness, distance, temperature, size. Sun, spectral classification of stars, white dwarfs, neutron stars, black holes, clusters, nebulae, galaxies, quasars, cosmology, and cosmogony.

GC 1163. Physical Systems: Principles and Practices. (4 cr. Prereq–0713 or 0721 or equiv)
Fundamental principles governing motion/interactions of matter. Motion, forces, and their applications to systems in physical world. Lecture, lab.

GC 1166. Principles of Chemistry. (3 cr. Prereq–0713 or 0721 or equiv)
Problem-solving. Classification of matter, elements, atomic/molecular structure, compounds, mole calculations, chemical bonding, empirical formulas, chemical reactions, stoichiometry, bond energy, enthalpy, gases/gas laws, solutions, solution concentrations, acids, bases, qualitative equilibrium.

GC 1171. Physical Geology. (4 cr)
Development of common land features (valleys, mountains, rivers, lakes) and processes responsible for their origin/change. Types of surface materials. Movements inside Earth and their effects on its surface. Lecture, lab: mineral/rock analysis, topographic map reading, landform identification, landscape interpretation.

GC 1172. Historical Geology. (4 cr)
Development of earth's physical/chemical features through time, with changing patterns of life as a response. Problem-solving, logical deductions from facts stressed. Lecture, lab: identification/interpretation of rocks, fossils, geologic maps, ancient environments, and geographies.

GC 1173. Geology of the National Parks. (4 cr)
Processes that produced scenic/geologic features of North America's national parks/monuments, using a regional approach. Role of national park system in modern society. Basic geology introduced as needed. Map analyses emphasized. Lecture, lab.

GC 1204. International Perspectives in the Social Sciences. (4 cr; A-F only)
Multidisciplinary exploration of world problems. Basic perspectives of four social sciences (anthropology, geography, political science, and economics) as applied to specific global problems such as terrorism, environmental degradation, and trade.

GC 1211. People and Problems. (4 cr)
Social problems that arise in a diverse society. Sociology as source of concepts/theories used to analyze problems such as unemployment, social inequality, violence, and environmental crisis. Fifteen hours in community involvement/service.

GC 1221. Minnesota History. (4 cr)
Minnesota geography, resources, exploration, settlement, ethnicity, economics, and politics related to the Upper Midwest, the United States, and Canada. Researching/writing family or local history as part of larger history of region and nation.

GC 1231W. U.S. Growth of National Power. (4 cr)
Political, technological, economic, and social aspects of growth of national power in the United States. Impact of U.S. power on people in North America and abroad, from the colonial era to present.

GC 1233. U.S. Government and Politics. (4 cr)
Structure and process. How government institutions address demands made on them. History/foundations of government structure. Institutions of power. Links between people and government. Government and social welfare. Economic, military, and foreign policies.

GC 1235W. Law in Society. (4 cr)
How social science concepts/research affect legal responses to social conflict. History/philosophy of American law. Interaction of social/legal institutions. Effect of beliefs/social conditions on laws addressing family, criminal, employment, and environmental controversies.

GC 1251. World History: Since 1500. (4 cr)
Political, economic, social, diplomatic, and intellectual aspects of major world cultures. Awareness of growing interdependence of peoples. International perspective on events that affect students' lives. Classroom simulations, lecture, discussion.

GC 1280. Psychology and Everyday Life. (3 cr)
Using psychological research/theory for effective living. Establishing positive relationships, managing stress, maintaining physical/mental health, leadership, gender roles, and work roles. Development of appropriate study strategies for social science courses. Readings, writing assignments, discussion.

GC 1281. General Psychology. (4 cr. §Psy 1001)
Individual instruction and computer technology are used to survey major psychological theories, concepts, and methods.

GC 1285W. Introduction to Cultural Anthropology. (4 cr)
Ways our lives are conditioned by culture. Fundamental anthropological concepts, theories, methods. Study of anthropological materials, collaborative social research, cross-cultural comparison. Recognizing cultural realities. Ways of life of other cultures.

GC 1294. Economics in Contemporary Society. (4 cr)
Economic concepts used to understand current events and government policies. Supply/demand, GDP, federal budget, fiscal/monetary policies, taxation, poverty, inflation, economic growth, unemployment, international trade.

GC 1311. Art: General Art. (3 cr. §3311)
Visual/performing arts produced in diverse American/international cultures. Slides, videos, galleries, performances, and music show how/why art is created. Students discuss various artworks, formulate/evaluate ideas/attitudes about art.

GC 1312. Identity, Community, and Culture: Connections in the Arts and Humanities. (4 cr; A-F only)
How multicultural arts/literature deal with themes of identity/community. Students practice one of the arts in class. Informal/critical writing. Lectures, discussions, interactive exercises, audiovisual presentations. Interdisciplinary, team-taught.

GC 1364. Literature of the American Immigrant Experience. (3 cr)
Literature by/about immigrants. Historical/contemporary American immigrant experiences (conditions leading to emigration, adjustments to and impact on the United States, inter-generational conflict). Readings include novels, poetry, expository prose, biographies, and oral histories.

GC 1365W. Literatures of the United States. (3 cr)
Stories, poetry, essays, and drama by diverse U.S. writers (mid-19th century to present) depicting conflicts/challenges of life in various stratas of American culture. Addresses multicultural aspect of the "American story."

GC 1366. Images of Women in Literature. (4 cr)
Diversity of 20th-century American women writers. Focuses on feminist re-interpretations of the literary canon. Portrayals of women across various identities based on race, class, sexuality, age, and religion. Readings include novels, short stories, poetry, essays, and plays.

GC 1367W. Contemporary Literature: International Perspectives. (4 cr)
Comparative readings in fiction, poetry, drama, and autobiography from contemporary writing not originating in the United States. Extensive formal/informal written assignments. Lecture, discussion.

GC 1371. Reading Short Stories. (3 cr)
Current short story format from diverse communities within North America, Africa, the Caribbean, and Europe. Emphasizes written literature inspired by oral "storytelling," storytelling as "theatre," and storytelling as communal endeavor.

GC 1374W. The Movies. (3 cr)
Aesthetics of feature-length films. Work of selected contemporary directors. Fundamentals of film study: mise-en-scène, editing, sound, photography, movement, screenplay, acting, and directing. Students write about films viewed in class.

GC 1421. Writing Laboratory: Basic Writing. (3 cr)
Develop academic reading, writing, and research skills. Students write in response to a variety of assignments, receive extensive one-on-one assistance, and work on computers. Clear/effective expression emphasized through writing/revision.

GC 1422. Writing Laboratory: Communicating in Society. (3 cr. §1423, §1424. Prereq–Grade of at least D in [1421 or equiv])
Conventions/skills of academic writing, reading, and research. How people communicate in society, perceive events/ideas, and think/write about them. Extensive use of computers for writing/research.

GC 1423. Writing Laboratory: Community Service Writing. (3 cr. §1422, §1424. Prereq–Grade of at least D in [1421 or equiv], #)
Writing description, research, and analysis based on work in community setting, and on readings/analysis. Students work three hours weekly at off-campus site for approximately seven weeks. Extensive research and writing practice. Requires use of microcomputer.

GC 1424. Writing Laboratory: Communicating in a Diverse Society. (3 cr. §1422, §1423. Prereq–Grade of at least D in [1421 or equiv])
Proficiency in academic writing, reading, research. Multicultural, thematic content. Extensive experience with computers as tools for writing/research.

GC 1454. Statistics. (4 cr. §Stat 1001. Prereq–Grade of at least C in 0731 or equiv)
Problem solving and decision making through collection, analysis, and interpretation of data. Organization/presentation of data, summary statistics, sampling, probability, distributions, estimation, correlation, hypothesis testing, contingency tables, chi-square. Uses groups and computers.

GC 1456. Functions and Problems of Logic. (3 cr)
Formal (symbolic) techniques (e.g., Venn diagrams, truth tables, formal proofs) for evaluating validity of arguments. Translating English statements into symbolic system. Structure/complexity of valid reasoning.

GC 1461. Oral Communication in the Public Sphere. (3 cr)
Communication, ethics, and citizenship in interpersonal, group, and public contexts. Communication theory/experience in diverse verbal/nonverbal communication patterns/strategies. Individual/group activities, public presentations.

GC 1464. Group Process and Discussion in a Multicultural Society. (3 cr)
Nature of groups, how they form/function, what purpose they serve in U.S. society, and how leadership and other role behaviors emerge from their structure. Multicultural approaches to conflict management, diverse verbal/nonverbal communication patterns/strategies.

GC 1481. Creativity Art Laboratory: Experiences in the Media. (3 cr)
Discussing, reading, and writing about art. Creating art that reflects personal/cultural identity. Multicultural art works explored through slides/videos. How to analyze, interpret, and evaluate artwork.

GC 1485. Creativity: Photography. (4 cr. Prereq–Own camera [35 mm w/adjustable controls preferred]; $50 lab fee)
Conceptual, technical, and historical aspects of photography as art. Hands-on experience with camera control, film development, enlarging, and printing in black-and-white. Individual/group critiques of student portfolios. Lab.

GC 1511. Introduction to Business and Society. (4 cr)
Role of business in economic/social life of the United States. Symbiotic relationship between business activity and broader aspects of society. Environmentalism, consumerism, cultural diversity, economic systems, ethics, management, marketing, accounting/finance, legal issues.

GC 1513. Principles of Small Business Operations. (3 cr)
Fundamentals of starting up, purchasing, owning, and operating a small business. Researching business opportunities. Assessing competition. Seeking financing. Organizing/planning internal matters. Developing operating strategies.

GC 1534. Practical Law. (4 cr)
American legal process. Everyday legal matters. Courts, crimes, personal injury, contracts, consumer transactions, property ownership/insurance, debtor-creditor relations, banking, bankruptcy, international law.

GC 1540. Accounting Fundamentals I. (3 cr)
Making accounting entries from business transactions in journals. Posting to ledger accounts. Completing accounting cycle. Preparing/interpreting financial statements.

GC 1571. Introduction to Microcomputer Applications. (4 cr. §1573, §1574. Prereq–0713 or 0717 or 0721 or 0722 or equiv)
Hands-on lab course. Instructor helps students individually during class. No lectures. Basic concepts. Word processing (edit/format text, tables, footnotes, headers, footers, mail merge, styles). Spreadsheets (data entry, format cells/worksheets, formulas, decision making using IF/THEN/ELSE, lookup tables, graphs).

GC 1573. Introduction to Word Processing. (2 cr. §1571. Prereq–0713 or 0721 or equiv)
Hands-on lab course. Instructor helps students individually during class. No lectures. Basic concepts. Editing/formatting text. Tables, footnotes, headers, footers, mail merge, styles.

GC 1574. Introduction to Spreadsheets. (2 cr. §1571. Prereq–0713 or 0721 or equiv)
Hands-on lab course. Instructor helps students individually during class. No lectures. Basic concepts. Entering data, formatting cells/worksheets. Formulas, decision making using IF/THEN/ELSE, lookup tables, graphs.

GC 1575. Introduction to Computers and the Internet. (4 cr. Prereq–0713 or 0721 or equiv)
Hands-on training in computer literacy. Hardware (microprocessor, memory, storage). Software (operating systems/applications). Internet (Web, e-mail, Telnet, FTP). Multimedia.

GC 1816. African-American Literature. (3 cr)
Short stories, novels, poetry, and drama by African American writers evaluated in context of internationalization. Interconnection between literature of African Americans in the United States and other international writers of African descent.

GC 1836. Asian-American Literature. (3 cr)
Historical/contemporary prose, poetry, and drama analyzed to assess writers' interpretations of their identity. Issues of generational conflict/peer pressure.

GC 1851. Multicultural Relations. (3 cr)
Nature of historical/contemporary multicultural relationships within American society. Intercultural, interethnic, interracial, and cross-gender relationships from historical/contemporary perspectives. Tools to think about complex issues.

GC 1901. Freshman Seminar: Environmental Issues. (3 cr. §1902, §1903, §1904. Prereq–Less than 24 cr)
Reading, discussion, critical analysis, and writing about environmental issues. Intensive, small-group setting.

GC 1902. Freshman Seminar: Cultural Diversity. (3 cr. §1901, §1903, §1904. Prereq–Less than 24 cr)
Reading, discussion, critical analysis, and writing about cultural diversity. Intensive, small-group setting.

GC 1903. Freshman Seminar: Citizenship and Public Ethics. (3 cr. §1901, §1902, §1904. Prereq–Less than 24 cr)
Reading, discussion, critical analysis, and writing about citizenship/public ethics. Intensive, small-group setting.

GC 1904. Freshman Seminar: International Perspectives. (3 cr. §1901, §1902, §1903. Prereq–Less than 24 cr)
Reading, discussion, critical analysis, and writing about international perspectives. Intensive, small-group setting.

GC 1906W. Freshman Seminar: Environmental Issues. (3 cr. §1907, §1908, §1909. Prereq–Less than 24 sem cr)
Reading, discussion, critical analysis, and writing about environmental issues. Intensive, small-group setting.

GC 1907W. Freshman Seminar: Cultural Diversity. (3 cr. §1906, §1908, §1909. Prereq–Less than 24 sem cr)
Reading, discussion, critical analysis, and writing about cultural diversity. Intensive, small group setting.

GC 1908W. Freshman Seminar: Citizenship and Public Ethics. (3 cr. §1906, §1907, §1909. Prereq–Less than 24 sem cr)
Reading, discussion, critical analysis, and writing about citizenship and public ethics. Intensive, small group setting.

GC 1909W. Freshman Seminar: International Perspectives. (3 cr. §1906, §1907, §1908. Prereq–Less than 24 sem cr)
Reading, discussion, critical analysis, and writing about international perspectives. Intensive, small group setting.

GC 1990. Special Topics. (1-8 cr. Prereq–#, ❑)
Topics related to instructor's areas of expertise.

GC 1993. Directed Study. (1-8 cr. Prereq–#, ❑)
Student-initiated project in consultation with faculty monitor. Student determines topic, sets goals, designs a course of study, and finds an appropriate faculty member to work with collaboratively.

GC 1996. Internship. (1-8 cr. Prereq–#, ❑)
Skills, techniques, and research in disciplinary content associated with college teaching. Goals/functions of public/community agencies. Career goals. Internships supervised by faculty monitor and site supervisor.

GC 2283W. Psychology of Human Development. (4 cr. §1283. Prereq–[1281 or Psy 1001], [1421 or EngC 1011])
Biosocial, cognitive, psychosocial development of individuals over life span. Writing intensive. Computer assisted instruction, video, small group discussion.

GC 2357. World Religious Beliefs. (4 cr. §1357. Prereq–[1421 or equiv], at least 12 cr)
Beliefs, rituals, attitudes of world's major living religions. Parallel "little traditions" in their historical, social, cultural settings. Intensive writing/reading.

GC 2375W. Film and Society. (4 cr. §1375. Prereq–12 cr, #)
Films as medium for social/cultural expression. Problems of individuals' values or identities in conflict with societal demands/constraints (racism, sexism, urban living, family living, aging, politics, education, sexual mores, adolescence). Social issues in contemporary documentary films.

Genetics, Cell Biology, and Development (GCD)

Department of Genetics and Cell Biology

College of Biological Sciences

GCD 3022. Genetics. (3 cr. §Biol 4003. Prereq–Biol 1002 or 1009; not for biology majors)
Mechanisms of heredity, their implications for biological populations, and applications to practical problems.

GCD 4015. Genetics Laboratory. (2 cr. Prereq–3022 or Biol 4003 or BioC 4332)
Introduction to experimental techniques used in genetic analyses. Although experiments may vary from semester to semester, genetic experiments with model systems ranging from viruses to plants and animals are performed.

GCD 4025. Cell Biology Laboratory. (2 cr. Prereq–Biol 4004 or #)
Experimental approaches to cell structure, function, and replication. Microscopy, autoradiography, cell fractionation, molecular/chemical analyses.

GCD 4034. Molecular Genetics. (3 cr. Prereq–Biol 4003, Biol 4004; advanced bioscience undergrad recommended)
Molecular genetics of prokaryotes/eukaryotes. Gene regulation, genome analysis. Modern techniques such as recombinant DNA, targeted mutations, genome manipulation, and gene chip technology.

GCD 4111. Histology: Cell and Tissue Organization. (4 cr. Prereq–Biol 4004 or #)
Structure and function of vertebrate tissues and organs. Lectures combine electron microscopy, light microscopy, physiology, and cell biology of higher animals. Labs concentrate on light microscopy of mammalian tissues.

GCD 4134. Endocrinology. (3 cr. Prereq–Biol 3211 or Biol/BioC 3021 or BioC 4331 or #)
Survey of structure and function of invertebrate and vertebrate endocrine systems.

GCD 4143. Human Genetics. (3 cr. Prereq–3022 or Biol 4003 or #)
Principles of human genetics at the molecular, cellular, individual, and populations levels. Chromosomal and biochemical disorders; gene mapping; mutation and natural selection; variation in intelligence and behavior; genetic screening, counseling and therapy.

GCD 4151. Molecular Biology of Cancer. (3 cr. Prereq–Biol 4003)
Regulatory pathways involved in directing normal development of complex eukaryotic organisms, how disruptions of these pathways can lead to abnormal cell growth/cancer. Causes, detection, treatment, prevention of cancer.

GCD 4161. Developmental Biology. (3 cr. Prereq–Biol 4003, Biol 4004)
Mechanisms that govern development from gametogenesis through fertilization. Embryogenesis/postembryonic development. Mechanisms of morphogenesis/differentiation. Classical/molecular approaches in various model organisms. Genetic models such as bacteriophage, yeast, Drosophila, C. elegans, Arabidopsis, zebrafish, and the mouse.

GCD 4793W. Directed Studies: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature. Written report.

GCD 4794W. Directed Research: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Laboratory or field investigation of selected areas of research including written report.

GCD 4993. Directed Studies. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Individual study on selected topics or problems. Emphasizes selected readings and use of scientific literature.

GCD 4994. Directed Research. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Laboratory or field investigation of selected areas of research.

GCD 5036. Molecular Cell Biology. (3 cr. Prereq–Biol 4004 or #; [sr or grad student] recommended)
Modern, integrative approaches combining cell/molecular biology, biochemistry, and genetics to investigate cell organization/function. Membranes, signaling, extracellular matrix, secretion, endocytosis, cytoskeleton, nucleus. Analysis of scientific papers to illustrate new concepts in and experimental approaches to cell organization/function.

Geographic Information Science (GIS)

Department of Geography

College of Liberal Arts

GIS 5571. Introduction to Arc/Info. (3 cr. Prereq–Geog 5561 or equiv, status in MGIS program, familiarity with computer operating systems or #)
Introductory overview of the Arc/Info system. Topics include data capture, geometric transformations and map projections, topology, editing systems, database management and map production.

GIS 5572. Advanced Arc/Info. (3 cr. Prereq–5571, Geog 5561 or equiv, status in MGIS program or #)
Advanced course in Arc/Info providing in-depth exploration of the topics emphasized in GIS 5571 as well as advanced topics including dynamic segmentation, address matching, and macro language programming.

GIS 5573. Desktop Mapping. (1.5 cr. Prereq–Geog 5561 or equiv, Geog 3511 or equiv, status in MGIS program or #)
Introduction to desktop mapping systems such as ArcView, MapInfo and Maptitude. Emphasizes the application of these systems to the display and analysis of geographical data.

GIS 5574. GIS and the Internet. (1.5 cr. Prereq–Geog 5561 or equiv, status in MGIS program or #)
The role of the Internet in GIS applications. Topics include GIS data sources on the Internet, the role of the Internet in information dissemination, Internet capabilities for interactive mapping and issues surrounding the development of GIS-related Web sites.

GIS 5575. Surveying and the Global Positioning System (GPS). (2 cr. Prereq–Geog 5561 or equiv, status in MGIS program or #)
Introduction to GPS (Global Positioning System) and other surveying techniques of use to GIS professionals. Topics include geodesy, data adjustment, datums, ellipsoids, coordinate systems, and transformations.

GIS 5576. Raster-Based GIS. (1.5 cr. Prereq–Geog 5561 or equiv, status in MGIS program or #)
Introduction to raster-based geographic information systems. Focuses on raster data sets and the use of grid-based models. Practical experience is offered using a widely-available raster GIS package.

GIS 5577. Spatial Data Administration. (2 cr. Prereq–Geog 5561, Geog 5563 or equivs, status in MGIS program, familiarity with computer operating systems or #)
Theory and application for the administration of geographic databases including the topics of quality assurance, development planning and management, maintenance, access and distribution, and documentation.

GIS 5590. Special Topics in GIS. (1-3 cr [max 6 cr]. Prereq–#)
Special topics in geographic information science (GIS). Topics vary according to student needs, technological developments in field.

Geography (Geog)

Department of Geography

College of Liberal Arts

Geog 1301V. Honors: Introduction to Human Geography. (4 cr. Prereq–Honors)
Geography of population, principal ways of life. Capacity of earth for future population.

Geog 1301W. Introduction to Human Geography. (4 cr)
Geography of population and principal ways of life; capacity of earth for future population.

Geog 1403V. Honors: Biogeography of the Global Garden. (4 cr. Prereq–Honors)
Geography of biodiversity/productivity, from conspicuous species to those that cause human disease, economic hardship. Roles played by evolution/extinction, fluxes of energy, water, biochemicals, dispersal. Experiments demonstrating interactions of managed/unmanaged biotic with hydrologic cycle, energy budgets, nutrient cycles, carbon budget, soil processes.

Geog 1403W. Biogeography of the Global Garden. (4 cr)
The geography of biodiversity and productivity, from conspicuous species to those that cause human disease and economic hardship. The roles played by evolution and extinction, fluxes of energy, water, biochemicals, and dispersal. Experiments demonstrating interactions of managed and unmanaged biotic with the hydrologic cycle, energy budgets, nutrient cycles, the carbon budget, and soil processes.

Geog 1425. Introduction to Meteorology. (3 cr. §Soil 1425)
Nature of atmosphere, its behavior. Atmospheric composition, structure, stability, motion. Precipitation processes, air masses, fronts, cyclones, anticyclones. General weather patterns. Meteorological instruments/observation. Weather map analysis. Weather forecasting.

Geog 1426W. Introduction to Meteorology Laboratory. (2 cr)
Offered in conjunction with 1425. Weather observation, meteorological instrumentation. Statistical analysis of weather observations, climatological data. Map analysis, weather forecasting.

Geog 1502. Maps, Visualization and Geographical Reasoning. (4 cr)
Fundamental issues related to the acquisition, storage, manipulation, analysis, display and interpretation of spatially-referenced data. Emphasis on mathematical analysis of these data and interpretation of cultural and physical patterns critical to the development of geographical reasoning.

Geog 1906W. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule.*

Geog 1973W. Geography of the Twin Cities. (3 cr)
Social and physical characteristics of the Twin Cities. Their place in the urban network of the United States.

Geog 3001. Geographic Inquiry and Human Development. (3 cr)
Principles of geographic inquiry applied to understanding development. Climate formation; vegetation, soils; natural resources; cultural systems; production systems; demographic change; settlement and communications systems; cultural diffusion; political systems, nations, geopolitics; flows of goods, people, money; contrasting development visions; development inequalities.

Geog 3001H. Honors: Geographic Inquiry and Human Development. (3 cr. Prereq–Honors)
Principles of geographic inquiry applied to development. Climate formation. Vegetation, soils. Natural resources. Cultural systems. Production systems. Demographic change. Settlement, communications systems. Cultural diffusion. Political systems, nations, geopolitics. Flows of goods, people, money. Contrasting development visions. Development inequalities.

Geog 3101. Geography of the United States and Canada. (4 cr. §3102)
Analysis of the ways in which the aspirations and abilities of diverse groups of people interact with the complexities of the natural environment to produce the contemporary pluralistic cultures and regional differentiation of the United States and Canada.

Geog 3102. Geography of the United States and Canada. (3 cr. §3101)
Analysis of ethical dilemmas and policy issues that arise as a result of the diverse ways in which different groups of people interact with the complexities of the natural environment in various regions of the United States and Canada.

Geog 3111. Geography of Minnesota. (3 cr)
The evolution of Minnesota and its current geographical characteristics. The state is a unique political entity that possesses similarities with other states because of the homogenizing influence of the federal government.

Geog 3141. Africa. (3 cr)
Regional differentiation of human groups and environments; culture contact and problems of underdeveloped countries south of the Sahara.

Geog 3145. Geography of the Islamic World. (3 cr; A-F only)
Foundation of Islam in Arabian Peninsula, its spread to Asia and Africa. Islamic civilization, influence on Europe before rise of capitalism. Rise of Capitalist Europe, colonization of Islamic World Islamic resurgence and post-colonial World. State-society and development. Culture/conflict in Moslem societies. Gender and Islam. Islamic World and the West. Moslems in North America and Europe. Case studies.

Geog 3158. Southern Africa: Apartheid and Beyond. (3 cr; A-F only. Prereq–Soph or jr or sr)
Historical geography. Clash of economic/cultural systems. Colonization, destruction of traditional political economy, settlement, dispossession. Capitalist agriculture, racist economy. Mining, consolidation of racist political economy. Migration/labor. Resistance to colonialism/apartheid. Independence/development north of Limpopo river. Regional implications of struggle against apartheid. Development in post-apartheid Southern Africa.

Geog 3161W. Europe: A Geographic Perspective. (3-4 cr)
Comparative analysis and explanation of Europe's physical, demographic, ethnic/cultural, economic, political, and urban landscapes; European integration - the European Union; transformation of Eastern Europe. German language discussion group in conjunction with the course for 1 extra credit.

Geog 3181W. Russia and Environs. (3 cr. §5181)
Physical and human geography of Russia and former Soviet republics. Legacy of central planning on regional economies, city systems and city structure. Economic and cultural links among regions and republics. Conflicts rooted in religion, ethnicity and tradition. Relations with nearby states and regions. Physical environmental problems.

Geog 3211. East Asia. (3 cr. §5211, §EAS 3211)
Physical and human geography of Japan, mainland China and Taiwan, North and South Korea; population pressure, economic and urban development, and international relations.

Geog 3215. Geography of China. (3 cr. §3211, §5211, §5215)
Physical, human, and historical geography of greater China: mainland China and Taiwan; demographic transition; national minorities, economic and urban development, and international relations.

Geog 3331. Geography of the World Economy. (3 cr)
Geographical distribution of resources affecting development; location of agriculture, industry, services; geography of communications; agglomeration of economic activities, urbanization, regional growth; international trade; changing global development inequalities; impact of globalizing production and finance on the welfare of nations, regions, cities.

Geog 3355W. Environmental Quality. (3 cr)
The quality of the human environment depends on 1) how humans make decisions about how to act, 2) how they act, and 3) how they evaluate both. In the United States, this process is best described as "disjointed incrementalism" in which governments, organizations, and individuals play distinct and important roles.

Geog 3361W. Land Use, Landscapes, and the Law. (3 cr)
Landscapes are political statements. They reflect how individuals, organizations, and governments have exercised the legal rights that they possess to produce goods and provide services.

Geog 3371V. Honors: Introduction to Urban Geography. (4 cr. Prereq–Honors)
Character, distribution, development of cities in present-day world. Internal/external locational relationships.

Geog 3371W. Cities, Citizens, and Communities. (4 cr)
Character, distribution, and development of cities in present-day world. Internal/external locational relationships.

Geog 3373W. Changing Form of the City. (3 cr)
Urban origins, ancient cultures/cities, the medieval city, rediscovery of planning, colonial cities. Industrialization and urban expansion. Speculative cities, utopian cities, planning triumphs/disasters. Cities as reflections of society, culture, the past.

Geog 3374V. Honors: The City in Film. (4 cr. §3374W, §5374. Prereq–Honors)
Cinematic portrayal of changes in 20th-century cities worldwide. Social/cultural conflict, political/economic processes, changing gender relationships, rural versus urban areas, population/development issues (especially as they affect women/children). Additional weekly meeting discusses films, readings. Project on a topic selected in consultation with instructor.

Geog 3374W. The City in Film. (4 cr. §5374)
Cinematic portrayal of changes in 20th-century cities worldwide including social and cultural conflict, political and economic processes, changing gender relationships, rural versus urban areas, and population and development issues (especially as they affect women and children).

Geog 3375. Minority Settlement in America. (3 cr)
Comparative analysis of minorities in American cities, including migration patterns, residential patterns, socioeconomic characteristics, public and private community enterprises, and class in urban structure.

Geog 3376. Political Ecology of North America. (3 cr. Prereq–Soph or jr or sr)
Social production of nature in North America related to questions of social/environmental justice. Economic, political, cultural, ecological relations that shape specific urban/rural environments, social movements that have arisen in response to environmental change. Importance of culture/identity in struggles over resources/environments.

Geog 3378. Third World Underdevelopment and Modernization. (3 cr)
Processes underlying socioeconomic change in the Third World. Evolving global economy and internal spatial and socioeconomic conditions. Theories of modernization, development, and underdevelopment.

Geog 3379. Environment and Development in the Third World. (3 cr; A-F only. Prereq–Soph or jr or sr)
Basic concepts for analyzing relations between capitalist development and environment in Third World. Analytical concepts about historical geography of capitalist development, geographically/historically specific case studies, likelihood of social/environmental sustainability.

Geog 3381W. Population in an Interacting World. (4 cr)
Comparative analysis and explanation of trends in fertility, mortality, internal and international migration in different parts of the world; world population problems; population policies; theories of population growth; impact of population growth on food supply and the environment.

Geog 3401V. Honors: Geography of Environmental Systems. (4 cr; A-F only. Prereq–Honors)
Geographic patterns, dynamics. Interactions of atmospheric, hydrospheric, geomorphic, pedologic, biologic systems as context for human population, development, resource use patterns.

Geog 3401W. Geography of Environmental Systems. (4 cr; A-F only)
Examination of geographic patterns, dynamics, and interactions of atmospheric, hydrospheric, geomorphic, pedologic, and biologic systems as the context for human population, development, and resource use patterns.

Geog 3411W. Geography of Health and Health Care. (3 cr. §5411)
Application of human ecology, spatial analysis, political economy, and other geographical approaches to analyze problems of health and health care. Topics include distribution and diffusion of disease; impact of environmental, demographic, and social change on health; distribution, accessibility, and utilization of health practitioners and facilities.

Geog 3431. Plant and Animal Geography. (3 cr. §5431)
Introduction to biogeography. Focuses on patterns of plant/animal distributions at different scales over time/space. Evolutionary, ecological, and applied biogeography. Paleobiogeography, vegetation-environment relationships, vegetation dynamics/disturbance ecology, human impact on plants/animals, nature conservation. Discussions, group/individual projects, local field trips.

Geog 3441. Quaternary Landscape Evolution. (3 cr; A-F only. Prereq–1403 or 3401 or #)
Roles of climate change, geomorphic history, vegetation change, and soil development in evolution of landscape patterns during Quaternary Period. Emphasizes North America.

Geog 3511. Principles of Cartography. (4 cr. Prereq–3 cr in geog or #)
History and development of U.S. academic cartography, coordinate systems and map projections, data classification and map generalization, methods of thematic symbolization, and cartographic design. A series of computer-based lab exercises will apply conceptual lecture material to the creation of thematic maps.

Geog 3531. Numerical Spatial Analysis. (4 cr)
Introduction to theoretical and applied aspects of geographical quantitative methods with a focus on spatial analysis. Emphasis placed on the analysis of geographical data for spatial problem solving in both the human and physical areas of the discipline.

Geog 3561. Principles of Geographic Information Science. (4 cr. Prereq–Jr or sr)
Introduction to study of geographic information systems (GIS) for geography and non-geography students. Topics include GIS application domains, data models and sources, analysis methods and output techniques. Lectures, readings and hands-on experience with GIS software.

Geog 3561H. Honors: Principles of Geographic Information Science. (4 cr. Prereq–Honors, [jr or sr])
Introduction to study of geographic information systems (GIS). GIS application domains, data models/sources, analysis methods, output techniques. Lectures, readings, hands-on experience with GIS software.

Geog 3605V. Honors: Geographical Perspectives on Planning. (4 cr. §3605W, §5605)
Role of planning in reshaping 19th-/20th-century cities in Europe, North America, selected Third World countries. History of planning. Societal change, interest groups, power relations in planning process. Citizen participation/practice in planning. Meets with 3605W. Includes additional weekly seminar-style meeting, bibliography project on a topic selected in consultation with instructor.

Geog 3605W. Geographical Perspectives on Planning. (4 cr)
Role of planning in reshaping 19th- and 20th-century cities in Europe, North America, and selected Third World countries. History of planning. Societal change, interest groups and power relations in the planning process. Citizen participation and practice in planning.

Geog 3671. Contemporary Chinese Society: Mainland China, Hong Kong, Taiwan. (3 cr; A-F only. §EAS 3482, §Soc 3671. Prereq–1301 or Soc 1001 or equiv in other social sciences or humanities or #)
With a focus on post-1949 mainland China, Taiwan, and Hong Kong, students will be introduced to the Chinese family, dating and marriage, rural and urban societies, population, work and occupation, socioeconomic development and inequalities, and impacts of post-1978 reforms.

Geog 3900. Topics in Geography. (3 cr [max 9 cr])
Special topics/regions covered by visiting professors in their research fields.

Geog 3973W. Geography of the Twin Cities. (3 cr. §1973)
Social/physical characteristics of Twin Cities. Their place in U.S. urban network.

Geog 3985V. Honors Senior Project Seminar. (4 cr. Prereq–Honors, #)
Completion of research/writing of senior project.

Geog 3985W. Senior Project Seminar. (4 cr. Prereq–[Jr or sr], #)
Complete the research/writing of senior project.

Geog 3992. Directed Reading. (1-8 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading.

Geog 3992H. Honors: Directed Reading. (1-8 cr [max 12 cr]. Prereq–Honors, #, Δ, ❑)
Guided individual reading.

Geog 3993. Directed Studies. (1-8 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual study.

Geog 3993H. Honors: Directed Studies. (1-8 cr [max 12 cr]. Prereq–Honors, #, Δ, ❑)
Guided individual study.

Geog 3994. Directed Research. (1-8 cr [max 12 cr]. Prereq–#, Δ, ❑)
Individual guided research.

Geog 3994H. Honors: Directed Research. (1-8 cr [max 12 cr]. Prereq–Honors, #, Δ, ❑)
Individual guided research.

Geog 4001. Modes of Geographic Inquiry. (4 cr)
Examination of competing approaches to the study of geography. Environmental determinism; regional tradition; scientific revolution; behavioral geography; modeling and quantitative geography; radical geography; interpretive and qualitative approaches; feminist and postmodern geography; ecological thinking and complexity; geographic ethics.

Geog 4002W. Social Theory and the Environment. (3 cr. Prereq–Jr or sr)
How human-nature relations are understood from perspective of social theory. Contemporary debates within human sciences. Interdisciplinary, reading-intensive.

Geog 4121W. Latin America. (3 cr)
Interplay of natural environment and history in shaping contemporary Latin America. Political ecology of natural resources, food supply and distribution, urbanization and the informal economy, migration, ethnicity, and the role of the state and international agencies in domestic economies.

Geog 4382. Contemporary Immigrant America. (3-5 cr)
Analysis and explanation of contemporary immigration trends; immigration policies; immigrant rights; immigrant integration and adaptation; ethnic group formation; ethnic identities; ethnic neighborhoods and communities; second generation; immigrant women; ethnic conflict; xenophobic reactions. Community Service Learning component for 2 extra credits.

Geog 5143. Geography of West Africa. (3 cr)
West Africa from Senegal to Cameroon; social geography of resource use, population, settlement, economic development, and international relations.

Geog 5145. Development in Africa. (3 cr. §Afro 5145)
Economic, political, and social development in Africa from independence to the present. Emphasis on reordering colonial landscapes, bases for North-South relations, big power intervention, and participation in the world economy.

Geog 5181. Russia and Environs. (3 cr. §3181)
Physical and human geography of Russia and former Soviet republics. Legacy of central planning on regional economies, city systems and city structure. Economic and cultural links among regions and republics. Conflicts rooted in religion, ethnicity and tradition. Relations with nearby states and regions. Physical environmental problems.

Geog 5211. East Asia. (3 cr. §3211, §EAS 3211)
Open to graduate students in East Asian studies and other disciplines who wish to study the region from a geographical perspective. Research paper. Meets with 3211.

Geog 5215. Geography of China. (3 cr. §3215)
Open to graduate students in East Asian studies and other disciplines who wish to study the region from a geographical perspective. Research paper. Meets with 3215.

Geog 5361. Geography and Real Estate. (4 cr)
Origins and evolution of land ownership in the United States.

Geog 5371W. American Cities I: Population and Housing. (4 cr. §PA 5201)
Emergence of North American cities; residential building cycles, density patterns; metropolitan housing stocks, supply of housing services; population and household types; neighborhood-level patterns of housing use; housing prices; intraurban migration; housing submarkets inside metro areas; emphasis on linking theory, method, case studies.

Geog 5372W. American Cities II: Land Use, Transportation and the Urban Economy. (4 cr; A-F only. §PA 5202)
Urban economy, its locational requirements. Central place theory. Transportation, urban land use: patterns/conflicts. Industrial/commercial land blight. Real estate redevelopment. Historic preservation. Emphasizes links between land use, transportation policy, economic development, local fiscal issues.

U.S.-Canadian contrasts.

Geog 5374W. The City in Film. (4 cr. §3374. Prereq–Grad student or #)
Cinematic portrayal of changes in 20th-century cities worldwide. Social/cultural conflict, political/economic processes, changing gender relationships, rural versus urban areas, population/development issues (especially as they affect women/children). Meets concurrently with 3374. Additional weekly meeting discusses films, readings. Project on a topic selected in consultation with instructor.

Geog 5385. Globalization and Development: Political Economy. (4 cr. Prereq–Sr or grad or #)
Nature/scope of modern world system (capitalism), its impact on regional development processes. Roles of state and of international financial institutions.

Geog 5393. The Rural Landscape. (4 cr)
Analysis of the three principal components of the rural landscape (the form of the land surface, the plant life that cloaks it, and the structures that people have placed upon it). Emphasis on structures associated with agriculture including some discussion on mining, forestry, resort areas, and small towns.

Geog 5411W. Geography of Health and Health Care. (3 cr. §3411)
Application of human ecology, spatial analysis, political economy, and other geographical approaches to analyze problems of health and health care. Topics include distribution and diffusion of disease; impact of environmental, demographic, and social change on health; distribution, accessibility, and utilization of health practitioners and facilities.

Geog 5421. Introduction to Atmospheric Science. (3 cr. §Soil 5401. Prereq–Familiarity with fundamentals of physics, calculus, and statistics, including differential and integral calculus and basic differential equations and basic thermodynamics, mechanics, and the electromagnetic spectrum)
Calculus-based introduction to atmospheric dynamics, radiation, thermodynamics, chemical composition, and cloud processes. Applications to climate, meteorology, the hydrologic cycle, air quality, and biogeochemical cycles.

Geog 5423. Climate Models and Modeling. (3 cr. Prereq–3401 or #)
Survey of development and research with simple and complex (three-dimensional) climate models. Environmental processes and their numerical representation in climate models; evaluation of model sensitivity and accuracy; coupling between atmosphere, biosphere, hydrosphere, and cryosphere; assessment of model predictions for climate change.

Geog 5426. Climatic Variations. (3 cr. Prereq–1425 or 3401 or #)
Theories of climatic fluctuations and change at decadal to centuries time scales; analysis of temporal and spatial fluctuations especially during the period of instrumental record.

Geog 5431. Plant and Animal Geography. (3 cr. §3431)
Introduction to biogeography. Focuses on patterns of plant/animal distributions at different scales over time/space. Evolutionary, ecological, and applied biogeography. Paleobiogeography, vegetation-environment relationships, vegetation dynamics/disturbance ecology, human impact on plants/animals, nature conservation. Discussions, group/individual projects, local field trips.

Geog 5441. Quaternary Landscape Evolution. (3 cr. Prereq–3401 or grad student or #)
Roles of climate change, geomorphic history, vegetation change, and soil development in the evolution of landscape patterns during the Quaternary Period, with emphasis on North America.

Geog 5444. Water Resources, Individuals and Institutions. (3 cr. §WRS 5101. Prereq–1402 or 3401 or grad or #)
How water resources are controlled by natural system functions, user actions, and the influence of social and political institutions. Explore how these three levels of control vary in space and time, paying particular attention to the complexities of each of these controls and the feedbacks among them.

Geog 5511. Advanced Cartography. (3 cr. Prereq–3511 or #)
Advanced topics on data sources for mapping; history of thematic cartography (focused on 19th-century European activity); multivariate classification and symbolization; models for cartographic generalization, spatial interpolation, and surface representation; principles of animated and multimedia cartography.

Geog 5512. Cartography: Topics. (3 cr. Prereq–3511 or 3531 or #)
Selected topics include the system of cartographic communication, map design, map reading, map analysis, history of cartography.

Geog 5530. Cartography Internship. (2-7 cr [max 10 cr]; S-N only. Prereq–#)
Provides intensive hands-on experience in contemporary map production and design, ranging from GIS applications to digital prepress. Strong computer skills essential.

Geog 5531. Numerical Spatial Analysis. (4 cr; A-F only. §3531)
Applied/theoretical aspects of geographical quantitative methods for spatial analysis. Emphasizes analysis of geographical data for spatial problem solving in human/physical areas.

Geog 5561. Principles of Geographic Information Science. (4 cr. Prereq–Grad)
Introduction to the study of geographic information systems (GIS) for geography and non-geography students. Topics include GIS application domains, data models and sources, analysis methods and output techniques. Lectures, reading, and hands-on experience with GIS software.

Geog 5562. Geographic Information Science and Analytical Cartography. (3 cr. Prereq–3561 or 5561 and 3511; or #)
Topics include algorithms and data structures for digital cartographic data, topological relationships, surface modeling and interpolation, map projections and geometric transformations, numerical generalization, and raster and vector processing. Hands-on experience using a variety of software packages.

Geog 5563. Advanced Geographic Information Science. (3 cr. Prereq–B or better in 3561 or 5561 or #)
Advanced study of geographic information systems (GIS). Topics include spatial data models, topology, data encoding, data quality, database management, spatial analysis tools and visualization techniques. Hands-on experience using an advanced vector GIS package.

Geog 5564. Urban Geographic Information Science and Analysis. (3 cr. Prereq–3561 or 5561)
Core concepts in urban geographic information science including sources for urban geographical and attribute data (including census data), urban data structures (focusing on the TIGER data structure), urban spatial analyses (including location-allocation models), geodemographic analysis, network analysis, and the display of urban data.

Geog 5565. Geographical Analysis of Environmental Systems and Global Change. (3 cr. Prereq–3561 or 5561 or FR 4131 or LA 5573 or one intro GIS course or grad or #)
Applications of geographic information systems and other spatial analysis tools to the analysis of environmental systems patterns, dynamics, and interactions. Focus on global to landscape databases developed to analyze atmospheric, hydrospheric, geomorphic, pedologic, biologic, and human land use systems.

Geog 5588. Multimedia Cartography. (3 cr. Prereq–Minimum of three geog courses, including one cartography course or advanced standing in an allied field such as landscape architecture or #)
Conceptualizing geographic topics in animatable form, selecting appropriate animation metaphors for specific ideas, using standard graphic software to prepare images for computer display and animation.

Geog 5605V. Honors: Geographical Perspectives on Planning. (4 cr. §3605W. Prereq–Honors or grad student)
Role of planning in reshaping 19th-/20th-century cities in Europe, North America, selected Third World countries. History of planning. Societal change, interest groups, power relations in planning process. Citizen participation/practice in planning. Meets with 3605. Includes additional weekly seminar-style meeting, bibliography project on topic selected in consultation with instructor.

Geog 5605W. Geographical Perspectives on Planning. (4 cr. §3605)
Open to graduate students and undergraduates wishing Honors credits. Includes one additional weekly seminar-style meeting and a bibliography project on a topic selected in consultation with the instructor. Meets with 3605.

Geog 5701. Field Research. (3 cr. Prereq–9 cr in geog, #)
Field investigation in physical, cultural, and economic geography; techniques of analysis and presentation; reconstruction of environments.

Geog 5724. Meanings of Place. (3 cr; A-F only. §Arch 5724. Prereq–Jr or sr or grad)
Analysis of the messages and meanings of our natural and built surroundings. Considers place-based responses to urban and rural settings based on aesthetic, historic, social, personal, and design perspectives. Uses extensive project and field work components and involves significant writing.

Geog 5775. Geographic Education. (3 cr. Prereq–Three courses in geography or history or social sciences or education or #)
Teaching geography from middle school up; pedagogical use of geographical themes; methods for effective teaching of multiple cognitive domains—facts, theories, analytical skills, and evaluations; designing audio-visual aids, independent projects, simulations, etc. to meet National Standards in geography.

Geog 5900. Topics in Geography. (3 cr [max 9 cr]. Prereq–sr or grad, #)
Special topics and regions. Course offered by visiting professors in their research fields.

Geological Engineering (GeoE)

Department of Civil Engineering

Institute of Technology

GeoE 3111. How to Model It: Building Models to Solve Engineering Problems. (3 cr)
Problem formulation design and construction of models, and drawing conclusions from modeling results. Students learn how to use computer-based modeling tools working in small groups on a number of problems from various engineering contexts.

GeoE 3301. Soil Mechanics I. (3 cr; A-F only. Prereq–IT student, AEM 3031)
Index properties and soil classification. Effective stress. Permeability and seepage. Stresses from elasticity theory. One-dimensional compression and consolidation; settlements. Compaction; cut and fill problems.

GeoE 3311. Rock Mechanics I. (3 cr; A-F only. Prereq–IT student, AEM 3031)
Classifications and index properties. Behavior of intact rock and rock masses. Failure criteria. Stereographic projections; kinematic analysis of rock slopes. Reinforcement. Foundations on rock.

GeoE 4102W. Capstone Design. (3 cr; A-F only. Prereq–CE, GeoE, or Geo upper division or graduate student or #)
Team participation in formulation and solution of open-ended civil engineering problems from conceptual stage through preliminary planning,

public hearings, design, and environmental impact statements to preparation of final plans and specifications, and award of contracts.

GeoE 4111. Engineering Systems Analysis. (3 cr. Prereq–Upper division IT)
Systems Analysis focuses on a broader "systems" approach of viewing problems. The techniques of operations research—decision engineering, network analysis, simulation, linear programming, and expert systems—are used to represent systems, and especially to assess trade-offs.

GeoE 4121. Computer Applications in Civil Engineering II. (3 cr; A-F only. Prereq–CE or GeoE upper div, 3101, Math 2243, Math 2263)
Advanced application of computer tools and methods in solving partial differential equations resulting from the analysis of civil engineering problems. The major tools used will be Spreadsheet and Visual Basic programming. Methods covered could include: finite differences, boundary element, finite element and control volume finite element.

GeoE 4301. Soil Mechanics II. (3 cr; A-F only. Prereq–Upper division student in IT; 3301, CE 3301, or #)
Traction and stress. Mohr-Coulomb failure criterion. Experiments on strength and angle of internal friction. Earth pressure theories; rigid and flexible retaining walls. Bearing capacity of shallow foundations. Stability of slopes.

GeoE 4311. Rock Mechanics II. (3 cr; A-F only. Prereq–Upper division or grad student in IT; 3311, CE 3311, or #)
Failure mechanisms in rock masses. Elasto-plastic solutions applied to underground excavations. Design of linings and support systems; rock-support interaction. In situ stresses and excavation shape. Instrumentation and monitoring.

GeoE 4341. Engineering Geostatistics. (3 cr; A-F only. Prereq–GeoE, CE, or Geo upper division or grad student, Stat 3021 or #)
Problem solving and decision making in civil and geological engineering using applied statistics. Emphasis on spatially correlated data, e.g. geologic site characterization, and spatial sampling design.

GeoE 4351. Groundwater Mechanics. (3 cr; A-F only. Prereq–IT upper division or grad student; CE 3502 or #)
Basic equations. Shallow confined and unconfined flows, two-dimensional flow in the vertical plane, and transient flow. Flow from rivers and lakes toward wells. Determination of streamlines and pathlines in two and three dimensions. Introduction to contaminant transport. Elementary computer modeling.

GeoE 4352. Groundwater Modeling. (3 cr; A-F only. Prereq–upper division or grad student in IT; 4351, CE 4351, or #)
Principle of analytic element method. Mathematical and computer modeling of single and multiple aquifer systems. Application to actual field problems. Theory and application of contaminant transport models, including capture zone analysis.

GeoE 5311. Experimental Geomechanics. (3 cr; A-F only. Prereq–IT upper division or grad student; 4301, CE 4301, or #)
Machine stiffness; closed-loop testing. Small-strain theory. Measurement of deformation; strain gages, LVDTs, accelerometers, and associated circuits. Direct and indirect testing. Material behavior: experiments on anisotropic, damaged, and fluid-filled solids.

GeoE 5321. Geomechanics. (3 cr; A-F only. Prereq–IT upper division or grad student; 4301, CE 4301 or #)
Review of elasticity theory and solution of some elastic boundary value problems relevant to geomechanics. Wave propagation in unbounded elastic media. Elements of fracture mechanics and applications. Elements of poroelasticity and applications.

GeoE 5331. Geomechanics Modeling. (3 cr; A-F only. Prereq–IT upper division or grad student, 4301 or CE 4301)
Soil and rock response in triaxial testing; drained and undrained behavior; elastic and plastic properties. Modeling stresses, strains, and failure in geomechanics problems.

GeoE 5431. Wave Methods for Nondestructive Testing. (4 cr; A-F only. §CE 5431. Prereq–[AEM 2021, AEM 3031] or #)
Introduction to contemporary methods for nondestructive characterization of objects of civil infrastructure (e.g., highways, bridges, geotechnical sites). Imaging technologies based on propagation of elastic waves: ultrasonic and resonant frequency methods, seismic surveys, acoustic emission monitoring. Lecture, lab.

Geology and Geophysics (Geo)

Department of Geology and Geophysics
Institute of Technology

Geo 1001. The Dynamic Earth: An Introduction to Geology. (4 cr)
Physical processes that shape the Earth: volcanoes, earthquakes, plate tectonics, glaciers, rivers. Current environmental issues/global change. Lecture/lab. Optional field experience.

Geo 1002. Earth History. (4 cr)
Evolution of life on Earth. Interrelationships of plate tectonism, climate change and organic evolution that led to the present ecosystem. Impacts of hominid evolution on Earth systems and of geological processes on human society.

Geo 1003. Dinosaur Evolution, Ecology, and Extinction: Introduction to the Mesozoic World. (3 cr)
Dinosaurs and the Mesozoic Earth are used to introduce evolution, plate tectonics, climate change, and Earth systems. Overview of the history of dinosaur interpretations illustrates the principles and social aspects of scientific investigation.

Geo 1004. Physical and Historical Geology of Minnesota. (4 cr)
Fundamentals of geology emphasizing Minnesota's geological setting. Minnesota examples and local field trips illustrate geologic principles. Geologic components of environmental, resource-management, and economic issues.

Geo 1006. Oceanography. (4 cr)
How various processes in the ocean interact. Marine biology, waves, tides, chemical oceanography, marine geology, and human interaction with the sea. Labs include study of live marine invertebrates, manipulation of oceanographic data, and discussion using videos showing unique aspects of ocean research.

Geo 1011. Volcanoes of the Earth. (4 cr)
Nonmathematical introduction to volcanoes, their origin and distribution on Earth and through time; theory of plate tectonics, origin of magmas and the Earth's interior; products of volcanoes, types of eruptions and hazards, and impact on climate, vegetation, and society.

Geo 1019. Our Changing Planet. (4 cr. §Ast 1019, §EEB 1019)
Interdisciplinary study of Earth as a set of interacting, evolving systems—solid Earth, oceans, atmosphere, and biosphere—and its relationship with the sun and stars. Cycling of matter and energy in Earth systems, their equilibria, and the effect of natural and human perturbations.

Geo 1081. Conspiracies, Fraud, and Deception in Earth History. (1 cr)
Famous cases of geological deception from three centuries are presented in the intellectual context of their time and demonstrate the prevailing power of scientific reasoning.

Geo 1101. Introduction to Geology. (3 cr. §1001)
Physical processes that shape the Earth: volcanoes, earthquakes, plate tectonics, glaciers, rivers. Current environmental issues and global change. Lecture.

Geo 1102. Introduction to Earth History. (3 cr. §1002)
Evolution of life on Earth. Interrelationships of plate tectonism, climate change, and organic evolution that led to the present ecosystem. Impacts of hominid evolution on Earth systems and of geological processes on human society.

Geo 1901. Freshman Seminar: Environment. (1-3 cr [max 6 cr]; A-F only. Prereq–Fr with no more than 24 cr)
Topics vary. See *Class Schedule*.

Geo 1904. Freshman Seminar: International Perspective. (1-3 cr [max 6 cr]; A-F only. Prereq–Fr with no more than 24 cr)
Topics vary. See *Class Schedule*.

Geo 1905. Freshman Seminar. (1-3 cr; A-F only. Prereq–Fr with fewer than 24 cr.)
Topics vary. See *Class Schedule*.

Geo 1906W. Freshman Seminar: Writing Intensive and Environmental Theme. (1-3 cr; A-F only. Prereq–Fr with fewer than 24 cr after matriculation)
Topics vary: see freshman seminar topics.

Geo 1909W. Freshman Seminar: Writing Intensive and IP Theme. (1-3 cr; A-F only. Prereq–Fr with fewer than 24 cr after matriculation)
Topics vary: see freshman seminar topics.

Geo 1910W. Freshman Seminar: Writing Intensive. (1-3 cr; A-F only. Prereq–Fr with fewer than 24 cr after matriculation)
Topics vary: see freshman seminar topics.

Geo 2111H. Honors: Earth Science. (4 cr; A-F only. §1001. Prereq–IT Honors Curr or IT Honors Office consent)
Application of physics and chemistry to the structure and dynamics of the Earth.

Geo 2201. Geodynamics I: The Solid Earth. (3 cr. Prereq–¶Phys 1301 or #)
Dynamics of solid Earth, particularly tectonic system. Seismology, internal structure of Earth. Earth's gravity, magnetic fields. Paleomagnetism, global plate tectonics, tectonic systems. Field trip.

Geo 2301. Mineralogy. (3 cr. Prereq–[¶Chem 1021, ¶Math 1271] or #)
Crystallography, crystal chemistry, physics. Physical/chemical properties, crystal structures, chemical equilibria of major mineral groups. Lab includes crystallographic, polarizing microscope, X-ray powder diffraction exercises, hand-specimen mineral identification.

Geo 2302. Petrology. (3 cr. Prereq–2301 or #)
Magmatic and metamorphic processes, with an emphasis on plate tectonic interpretation of rock sequences.

Geo 2303W. Geochemical Principles. (3 cr. Prereq–¶Chem 1021 or #)
Origin of elements (nucleosynthesis, elemental abundances). Geochemical classifications. Isotopes (radioactive, stable). Phase equilibria. Models of Earth's geochemical evolution. Basic geochemical processes that produced Earth's lithosphere, hydrosphere, atmosphere.

Geo 3001. Earth Materials. (3 cr)
Common rocks/minerals and their geologic settings. Properties of these materials as basis for identification/use in industry/society.

Geo 3002. Climate Change and Human History. (3 cr)
Causes of long-/short-term climate change. Frequency/magnitude of past climate changes; their geologic records. Relationship of past climate changes to development of agrarian societies and to shifts in power among kingdoms/city-states. Emphasizes last 10,000 years.

Geo 3003. Geohazards. (3 cr)
Geologic hazards associated with earthquakes/volcanoes. How society confronts dangers posed by

these phenomena. Geological/geophysical nature/causes of earthquakes/volcanoes. Prediction/risk assessment. Public policy issues.

Geo 3004. Water and Society. (3 cr)
Processes that influence formation, circulation, composition, and use of water. Human influence on water quality through agricultural, industrial, and other land-use practices. International case studies examine human interaction with surface environment, influence of local land-use practices.

Geo 3005. Earth Resources. (3 cr)
Geologic aspects of energy/material resources. Resource size/life-times. Environmental consequences of resource use. Issues of international/public ethics associated with resource production, distribution, and use.

Geo 3006. Planets of the Solar System. (3 cr)
Recent accomplishments of space missions. Diverse/common characteristics of planetary formation. Surface processes/interior dynamics. Meteoritic impacts. Comets. Other solar systems/possibility of life.

Geo 3093. Problems in Geology and Geophysics: Junior. (1-4 cr [max 6 cr]. Prereq–#)
Geological or geophysical problems studied independently under the direction of a faculty member.

Geo 3202. Geodynamics II: The Fluid Earth. (3 cr. Prereq–¶2201)
Dynamics of fluid Earth, mainly surface processes and convection.

Geo 3401. Geochronology and Earth History. (3 cr. Prereq–2303)
Modern high precision techniques for quantifying geologic time. Litho-, bio-, and chrono-stratigraphic correlation techniques for reconstructing geologic history.

Geo 3870. Modeling Workshop. (1 cr [max 2 cr]. Prereq–Geo or Geophys or GeoEng major or #)
Modeling of geologic or geophysical systems.

Geo 3880. Laboratory Workshop. (1 cr [max 2 cr]. Prereq–Geo or Geophys or GeoEng major or #)
Geologic or geophysical lab study.

Geo 3890. Field Workshop. (1 cr [max 2 cr]. Prereq–Geo or Geophys or GeoEng major or #)
Geologic or geophysical field study.

Geo 3911. Introductory Field Geology. (4 cr; A-F only. Prereq–3202, #)
Geologic mapping on topographic maps and aerial photos; field identification of igneous, sedimentary and metamorphic rocks; measurement of stratigraphic sections; study of structural and geomorphic features.

Geo 4010. Undergraduate Seminar: Current Topics in Geology and Geophysics. (1-4 cr [max 12 cr]. Prereq–#)
Topics in geology and geophysics investigated in a seminar format.

Geo 4093. Problems in Geology and Geophysics: Senior. (1-4 cr [max 6 cr]. Prereq–#)
Nonstructured research course enabling seniors to engage in independent research under faculty supervision.

Geo 4094. Senior Thesis. (2 cr [max 4 cr]. Prereq–Sr, Geo or GeoPhys major, #)
Nonstructured research course enabling senior-level majors to engage in independent research under faculty supervision. Select problems according to individual interests and in consultation with faculty committee. Thesis and oral defense.

Geo 4203. Principles of Geophysical Exploration. (3 cr. Prereq–Phys 1302)
Seismic exploration (reflection and refraction); potential techniques (gravity and magnetics) and electrical techniques of geophysical exploration.

Geo 4204. Geomagnetism and Paleomagnetism. (3 cr. Prereq–2201, Phys 1302, Math 1272 or #)
Present geomagnetic field at the Earth's surface, secular variation, geomagnetic field reversals. Physical and chemical basis of paleomagnetism: origin of natural remanent magnetization, mineralogy of magnetic minerals, magnetic polarity stratigraphy, apparent polar wander, and environmental magnetism.

Geo 4211. Solid Earth Geophysics I. (3 cr; A-F only. Prereq–2201, Phys 1302)
Basic elasticity, basic seismology, and physical structure of the Earth's crust and deep interior.

Geo 4212. Solid Earth Geophysics II. (3 cr; A-F only. Prereq–2201, Phys 1302)
Dynamics of the solid Earth, mostly mantle and core; seismic tomography, geothermal measurements, gravity, time-dependent deformation of the Earth, computer modeling.

Geo 4221. Application of Magnetism in the Natural Sciences and Engineering. (2 cr. §Phys 4221. Prereq–Phys 1302)
Multidisciplinary application of magnetism and magnetic phenomena. Survey for nonspecialists covers fundamental principles of magnetism and how this ubiquitous phenomenon is used in a variety of science and engineering disciplines. Physics of magnetism, rock magnetism, biomagnetism, magnetic sensors, and magnetic recording.

Geo 4301. Igneous and Metamorphic Petrology. (4 cr. Prereq–2302, Chem 3501, Math 2243 or #)
Theoretical course that develops basic thermodynamic tools and chemographic analysis for interpretation of chemical processes in igneous and metamorphic rocks. Lab, field trip, and problem sets.

Geo 4501. Structural Geology. (3 cr. Prereq–2201, 2302)
Fundamental concepts related to deformation of Earth's crust. Processes associated with deformation, faulting, folding, fabric development. Lab/recitation include solving problems, conducting physical/numerical experiments. Field trips.

Geo 4502. Tectonic Styles. (3 cr. Prereq–4501 or #)
Origin and nature of major types of tectonic disturbances affecting the crust and lithosphere, including analysis of the form and development of individual structural components and relationship to plate tectonics. Changes over geologic time in the nature of orogenic processes.

Geo 4503. Neotectonics. (4 cr. Prereq–4501 or #)
Integration of diverse elements of geology, geodesy, and geophysics to examine recent and active tectonics of the Earth's lithosphere; extensional, compressional and wrench tectonic regimes with case studies around the world; modern global plate motions, geodetic techniques, seismic anisotropy, climatically driven tectonics.

Geo 4601. Limnology. (3 cr; A-F only. Prereq–§EEB 4601, Chem 1022 or #)
Description and analysis of lakes and other aquatic environments, beginning with lake origins and progressing through lake physics, chemistry, and biology. Interrelationships among these topics and effects of human activities.

Geo 4602. Sedimentology and Stratigraphy. (3 cr. Prereq–2302, 3202)
Interpretation of origin of sedimentary rocks through application of basic physical/chemical principles. Modern depositional environments, petrographic microscopy, basin dynamics, stratigraphy.

Geo 4605. Limnology Laboratory. (1 cr; A-F only. §EEB 4605. Prereq–4601 or EEB 4601 or #)
Field and lab methods used to obtain information about environmental conditions in aquatic environments and to measure the abundance of aquatic organisms, especially plankton. Field and lab instruments, sampling devices, microscopy, water chemistry, and data analysis.

Geo 4631W. Earth Systems: Geosphere/Biosphere Interactions. (3 cr. Prereq–3401)
Interdisciplinary study of global-change forcing mechanisms, feedbacks, dynamics on various time scales, using paleorecord to illustrate processes.

Geo 4701. Geomorphology. (3-4 cr. Prereq–1001, Math 1031 or #)
Origin, development, and continuing evolution of landforms in various environments. Environmental implications. Weathering, slope and shore processes, fluvial erosion and deposition, arid region processes, glacial processes.

Geo 4703. Glacial Geology. (4 cr. Prereq–1001 or 1004 or #)
Formation and characteristics of modern glaciers; erosional and depositional features of Pleistocene glaciers; history of quaternary environmental changes in glaciated and nonglaciated areas. Field trips and labs.

Geo 4911. Advanced Field Geology. (4 cr; A-F only. Prereq–3911, #)
Geologic mapping; study of igneous, metamorphic, and sedimentary rocks; structures and surficial features; problem solving. Paper required.

Geo 4971. Field Hydrogeology. (4 cr. Prereq–5701, #)
Aquifer, vadoze zone, and surface water hydrology field techniques. Shallow soil boring and sampling. Well installation. Single and multiple well aquifer testing. Ground water sampling for chemical analysis. Weather data collection, hydrogeologic mapping, water balance calculation.

Geo 5001. Earth Systems Science for Teachers. (3 cr. §1001. Prereq–Educ degree)
Solid Earth, hydrosphere, atmosphere, biosphere, their interconnections in natural cycles of material/energy. Consequences of natural cycles for land-water-atmosphere-life environments/Earth's habitability. Human impact on natural cycles. Evidence for global environmental changes. Required project.

Geo 5002. Earth History for Teachers. (4 cr. §1002. Prereq–Ed degree)
Evolution of life on Earth. Interrelationships of plate tectonism, climate change, and organic evolution leading to present ecosystem. Impact of hominid evolution on Earth systems and geological processes on human society. Required project designed to enhance ability to teach Earth history to K-12 students.

Geo 5003. Dinosaur Evolution for Teachers. (3 cr. §1003. Prereq–Ed degree)
Dinosaurs and Mesozoic Earth used to introduce evolution, plate tectonics, climate change, and Earth systems. History of theories about dinosaurs illustrates principles and social aspects of scientific investigation. Required project designed to enhance ability to teach dinosaur evolution to K-12 students.

Geo 5006. Oceanography for Teachers. (3 cr. §1006. Prereq–Ed degree)
How various processes in the ocean interact. Marine biology, waves, tides, chemical oceanography, marine geology, and human interaction with the sea. Labs include study of live marine invertebrates, manipulation of oceanographic data, and discussion using videos showing unique aspects of ocean research. Required design of modules for presenting course material to elementary or secondary school students.

Geo 5108. Principles of Environmental Geology. (3 cr. Prereq–Geology majors: core curriculum through 4501 or #; nonmajors: 1001 or #)
Human impact on geological environment and effect of geology/geologic processes on human life from an ecosystems and biogeochemical cycles perspective. Geologic limits to resources and carrying capacity of Earth. Land use planning, environmental impact assessment, ecogeologic world models. Field project and trip.

Geo 5201. Time-Series Analysis of Geological Phenomena. (3 cr; A-F only. Prereq–Math 2263 or #)
Time-series analysis of linear and nonlinear geological and geophysical phenomena. Examples drawn from ice age cycles, earthquakes, climatic fluctuations, volcanic eruptions, atmospheric phenomena, thermal convection and other time-dependent natural phenomena. Modern concepts of nonlinear dynamics and complexity theory applied to geological phenomena.

Geo 5202. Geological Thermomechanical Modeling. (3 cr; A-F only. Prereq–Math 2263 or #)

For definitions of course numbers, symbols, and abbreviations, see page 296.

Concept of heat and mass transfer processes in Earth's crust and mantle. Quantitative study of thermomechanical phenomena. Emphasis on analytical and modern numerical techniques.

Geo 5203. Mineral and Rock Physics. (3 cr. Prereq–2201, Phys 1302)
Physical properties of minerals and rocks as related to the composition and dynamics of the Earth's crust, mantle, and core.

Geo 5301. Aqueous Environmental Geochemistry. (3 cr. Prereq–Chem 3501 or #)
General principles of solution chemistry applied to geology. Solution-mineral equilibria. Redox processes in natural waters. Geochemistry of hydrothermal fluids. Environmental geochemistry.

Geo 5302. Isotope Geology. (3 cr; A-F only. Prereq–2303 or #)
Theory and uses of radioactive, radiogenic, and stable isotopes in geology. Radioactive dating, geothermometry, and tracer techniques in geologic processes.

Geo 5353. Electron Microprobe Theory and Practice. (2-3 cr. Prereq–2301, one yr chem and physics or #)
Theory and practice of characterizing solid materials with electron beam instrumentation, including the reduction of X-ray data to chemical compositions.

Geo 5502. Advanced Structural Geology. (3 cr. Prereq–4501 or #)
Analysis of structures and fabric of deformed rocks. Determination of states of stress and strain in rocks and of evolution of these with time. Deformation mechanisms. Extensive reading in journal literature. Field trips.

Geo 5601. Advanced Sedimentology. (4 cr. Prereq–4602 or #)
Modern techniques of sedimentary basin analysis focusing on interactions among the lithosphere, atmosphere, and hydrosphere. Sedimentary facies of modern and ancient systems, petrology of clastic and carbonate deposits, tectonic and paleoclimatic interpretations, paleocurrent analysis, diagenetic effects on subsurface fluid flow, and volcanic sedimentation.

Geo 5602. Depositional Mechanics. (3 cr. Prereq–4602, Math 2243 or #)
Elementary mechanics of sediment transport applied to quantitative interpretation of sedimentary rocks.

Geo 5701. General Hydrogeology. (4 cr. Prereq–Chem 1022, Math 1271, Phys 1201, Geo majors-core curriculum through 2402 or #)
Theory of groundwater geology, hydrologic cycle, watershed hydrology, Darcy's law, governing equations of groundwater motion, flow net analysis, analog models, and groundwater resource evaluation and development. Applied analysis of steady and transient equations of groundwater motion and chemical transport. Chemistry of natural waters.

Geo 5702. Regional Aquifer Systems of North America. (3 cr. Prereq–5701 or #)
Geologic controls on flow patterns within aquifer systems. Case histories and specific examples from glaciated terrains and Paleozoic basins in Minnesota. Analysis of basin-scale regional aquifer systems of North America. Survey of famous aquifer systems of the world.

Geo 5703. Regional Geomorphology. (2 cr [max 6 cr]. Prereq–4501 or #)
Geology of a particular region of the country, emphasizing its geomorphology. One-week field trip to the area is taken during spring break. May be taken for credit more than once if regions are different.

Geo 5704. Glaciology. (3-4 cr. Prereq–Math 2263 or #)
Theories of glacier flow. Internal structures and heat flow in glaciers and ice sheets. Geomorphic features produced by glaciers. Reading assignments and problems.

Geo 5705. Limnogeology and Paleoclimate. (3-4 cr. Prereq–1001, 4601 or #)
Systems study of modern and ancient lakes of the world as archives of environmental history, as natural resources, as biogeochemical and physical process models, and as basins in geologic history. Includes many case studies and examines aquatic signatures for interpreting paleoclimate.

Geo 5713. Tracers and Karst Hydrogeology. (3 cr. Prereq–5701, #)
Karst hydrogeology and application of tracers to determine source, age, and mixing parameters of water in various natural reservoirs. Physical and chemical principles and processes operating in karst hydrogeology; use of natural and synthetic chemical and isotopic labels or tracers to follow movement and mixing of water through hydrologic cycle.

Geo 5802. Scientific Visualization. (3 cr. Prereq–CSci 1107 or CSci 1113 or #)
Visualization hardware and software, three-dimensional graphics, representation of scientific data, modeling, user interface techniques, output, commonly used algorithms, animation, case studies and examples.

German (Ger)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

Ger 0222. Reading German. (0 cr; A-F only)
Teaches only a reading knowledge of German. Enables graduate students to satisfy departmental requirements for an advanced degree. Intensive reading of German scholarly texts. Emphasizes reading, grammar, some listening, discipline-specific vocabulary.

Ger 1001. Beginning German. (5 cr)
Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.).

Ger 1002. Beginning German. (5 cr. Prereq–1001)
Listening, reading, speaking, writing. Emphasizes proficiency. Topics include free-time activities, careers, and culture of German-speaking areas.

Ger 1003. Intermediate German. (5 cr. Prereq–1002 or Entrance Proficiency Test)
Listening, reading, speaking, writing. Contextualized grammar/vocabulary. Authentic readings. Essay assignments.

Ger 1004. Intermediate German. (5 cr. Prereq–1003 or completion of Entrance Proficiency Test at 1004 level)
Listening, reading, speaking, writing. Contextualized grammar/vocabulary. Authentic readings. Essay assignments.

Ger 1020. Beginning German Conversation. (2 cr [max 8 cr]. Prereq–1001 or equiv)
Maintaining language skills through conversational practice. Emphasizes speaking skills, but also includes listening, reading, writing. Reviews essential grammatical structures.

Ger 1022. Beginning German Review. (5 cr. Prereq–Placement above 1001)
Intended for students with previous experience in German, primarily those who have studied German in high school or at community colleges, or who are transfer students. Intensive review of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis to prepare for German 1003.

Ger 1024. Advanced Intermediate German. (5 cr. Prereq–1003 or satisfactory completion of Entrance Proficiency Test with competency at the 1004 level)
Intended for students who have not taken the Graduation Proficiency Test and need a review before taking it. Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by authentic readings and essay assignments.

Ger 1030. Intermediate German: Reading and Writing. (2 cr [max 8 cr]. Prereq–1003 or equiv)
Consolidating/developing reading/writing skills.

Ger 1909W. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule*.

Ger 1910W. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

Ger 3011W. Conversation and Composition. (4 cr. Prereq–Passing score on the Graduation Proficiency Test)
Designed to help students achieve proficiency in professional or academic German. Attention is paid to the refinement of oral and written expression. A systematic review of the most important communicative modes of language and a wide range of topics are designed to take students to the advanced level of proficiency.

Ger 3012W. Conversation and Composition. (4 cr. Prereq–3011)
Prepares students for upper-level language and content courses in German. Continues the same focus and approach as 3011 with the addition of a larger reading component.

Ger 3014. German Media. (3 cr. Prereq–3012)
Introduction to German language media. Analysis of German language newspapers and magazine articles, the Internet, radio and television broadcasts. Close examination of the structure and style of journalistic prose.

Ger 3015. Professional German. (3 cr. Prereq–3012)
Introduction to scholarly and professional German, specifically to the technical terminology and structures in social science articles and textbooks. Prepares students for the Foreign Language Immersion Program (FLIP).

Ger 3016. Techniques of Translation. (3 cr. Prereq–3012)
Theory and practice of translation from and to German in a variety of genres. Idiomatics, stylistics, and cross-cultural aspects of translation will be highlighted.

Ger 3017. Advanced Communication Skills. (3 cr. Prereq–3012)
Focuses on learning strategies for immersion students to process and understand academic language in texts and lectures in the FLIP courses.

Ger 3021. Business German. (3 cr. Prereq–3012 or equiv)
Provides basic knowledge of German economy and business culture. Practice of language used in business field. Reading and discussion of German business documents, preparation of formal letters and reports.

Ger 3022. Advanced Business German. (3 cr. Prereq–Ger 3021 or equiv)
Provides more intensive training in vocabulary and practices of German business in such areas as banking, trade, import/export, business management, marketing. Prepares students for the "International Test of Business German."

Ger 3104W. Reading and Analysis of German Literature. (4 cr. Prereq–3012)
Introduction to literary analysis; readings from drama, prose, and lyric from the 18th century to the present.

Ger 3410. German Literature Before 1750. (3 cr [max 9 cr]. Prereq–3104)
Study of representative literary texts of the German High Middle Ages, Renaissance, Reformation, and the Baroque in cultural-historical context. Readings in modern German translation or English.

Ger 3421. 18th-Century German Literature. (3 cr. Prereq–3104)
Investigation of German literature between 1720-1810, Enlightenment and Weimar Classicism in historical and cultural context. Reading and discussion of literary and philosophical works and aesthetic criticism.

Ger 3431. 19th-Century Literature. (3 cr. Prereq–3104)

Literary and cultural exploration of 19th-century German literature through an investigation of the literary movements of Romanticism, Realism, and Naturalism. Reading and discussion of literary and critical texts.

Ger 3441. 20th-Century Literature. (3 cr. Prereq–3104)
German literature from 1890 to present in historical, political, social, and cultural context.

Ger 3460. Women Writers in German Literature. (3 cr [max 9 cr]. Prereq–3104)
A literary and historical investigation of selected German women writers from the theoretical perspectives of feminist theory, gender studies, and cultural studies/theory. Approaches may be thematic, generic, or chronological.

Ger 3490. Topics in German Literature. (3 cr [max 9 cr]. Prereq–3104)
Intensive exploration of specific authors, literary genres, or other literary topics not covered in period courses.

Ger 3501. Contemporary Germany. (3 cr. Prereq–¶3012)
Social, political, and cultural developments in Germany from 1945 to the present.

Ger 3510. Topics in German Studies. (3 cr [max 9 cr]. Prereq–¶3012)
One topic in depth dealing with the culture or civilization of German-speaking countries.

Ger 3511W. German Civilization and Culture: Middle Ages to 1700. (4 cr)
Survey of representative cultural-historical events in Germany from early Germanic times to 1700.

Ger 3512W. German Civilization and Culture: 1700 to the Present. (4 cr)
Survey of representative cultural-historical events in Germany from 1700 to the present.

Ger 3520. Topics in Austrian and Central European Culture. (3 cr [max 9 cr]. Prereq–¶3012)
Culture, politics, and economy in Austria and Central Europe. Comparative analysis of cultural/political developments. Topics vary.

Ger 3531. Selected Writings in German Intellectual History. (3 cr. Prereq–3104)
Philosophical writings on culture, history, and art. Authors include Lessing, Schiller, Kant, Hegel, Marx, Nietzsche, and Freud.

Ger 3593. Directed Studies: German-Speaking Countries. (4 cr [max 12 cr]. Prereq–3012, Δ)
Preparation for research abroad during semester before departure. Written and oral reports upon return.

Ger 3601. German Medieval Literature. (3 cr. Prereq–No knowledge of German required)
Literary investigation of the greatest works of medieval German poetry. Readings in English. Majors will be required to write a paper with use of secondary sources in English and German.

Ger 3604W. Introduction to German Cinema. (3 cr)
An introduction to the study of German cinema, with a focus on the relation between German film and German history, literature, culture, and politics.

Ger 3610. German Literature in Translation. (3 cr [max 9 cr]. Prereq–No knowledge of German required; cr toward major or minor requires reading in German)
In-depth study of authors or topics from various periods in German literature.

Ger 3631. Jewish Writers and Rebels in German, Austrian, and American Culture. (3 cr. Prereq–No German required; cr toward major/minor requires reading in German)
Literary/cultural modes of writing used by Jewish writers in Germany, Austria, and America to deal with problems of identity, anti-Semitism, and assimilation. Focus on 20th century. All readings (novels, poetry, stories) in English.

Ger 3634. German Women and Cultural History: Constructing Selves in Narrative Texts. (3 cr. Prereq–No knowledge of German required; cr toward major or minor requires reading in German)
Examination of narrative texts by German women writers against a background of the cultural history of Germany during the 20th century. Focus on personal narrative texts, both written and pictorial, and readings in literary and cultural theory and history. All readings in English.

Ger 3641. German Folklore. (3 cr. Prereq–No knowledge of German required; cr for major or minor by arrangement with instructor)
Literary and cultural investigation of the main folklore genres: charms, legends, folktales, and ballads; their composition, origin, and role in society with a strong emphasis on their international character. Readings in English. Majors required to write a paper with use of secondary sources in English and German.

Ger 3642. The Grimms' Fairy Tales, Feminism, and Folklore. (3 cr. Prereq–No knowledge of German required; cr toward major or minor requires reading in German)
Exploration of the Grimms' fairy tales and investigation of how various folktale types and gender stereotypes developed and became classical models for children and adults. The genre of the literary fairy tale in Germany, Europe, and North America. Comparisons of original literary versions with contemporary tales. All readings in English.

Ger 3701. History of the German Language. (3 cr. Prereq–1004)
Change in grammar and lexicon, 750 A.D. to present.

Ger 3702. Beginning Middle High German. (3 cr. Prereq–1004)
Middle High German grammar. Selected literary texts.

Ger 3703. Introduction to Old High and Low German. (3 cr. Prereq–3702 or #)
Biographies, charms, heroic poetry, and miscellany from the 9th and 10th centuries.

Ger 3704. German Dialects. (3 cr. Prereq–1004)
Contemporary regional dialects recorded on tape and written in texts. Synchronic and diachronic analysis.

Ger 3705. Characteristics of the Germanic Languages. (3 cr. Prereq–3703, Ling 3601 or Ling 5601)
German and North Sea Germanic; West, North, and East Germanic; Proto-Germanic and Indo-European.

Ger 3993. Directed Studies. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Ger 4040. German Play: Oral Interpretation and Performance of German. (1-3 cr [max 9 cr])
Dramatic reading of German play for pronunciation; preparation and rehearsal for production and performance of German play.

Ger 4521. The German-Americans: Literary and Linguistic Aspects. (3 cr)
Study the contribution made by German immigrants to American culture, especially in Minnesota. Language and literature study is supplemented by field trips in Minnesota.

Ger 4621. German Cinema to 1945. (3 cr. Prereq–3xxx film course or #)
Beginnings of German cinema late 19th/early 20th century. "Golden age" during Weimar Republic (1918-1933). Expressionism and "New Objectivity." Its subordination to ideological/entertainment needs of Nazis' "Third Reich" (1933-45).

Ger 4622. German Cinema Since 1945. (3 cr. Prereq–3xxx film course or #)
German cinema during the first years of postwar occupation and then in each of the two postwar German states, East and West Germany, from 1949-1990, and finally in the unified Germany from 1990 on. Includes films of DEFA, "New German Cinema," feminist cinema, German comedies of the 1980s and 1990s, etc.

Ger 5011. Advanced Conversation and Composition. (3 cr. Prereq–3012)
Helps graduate and advanced undergraduate students achieve high proficiency in writing and speaking professional and academic German.

Ger 5016. Advanced Translation: Theory and Practice. (3 cr. Prereq–3016 or #)
Translation theory, related issues in stylistics, philosophy of language; sample translations; student production of translations with methodological commentary.

Ger 5101. Analysis of German. (3 cr. Prereq–1004, Ling 3001 or Ling 5001 or #)
Phonology, morphology, and syntax of standard German.

Ger 5410. Topics in German Literature. (3 cr [max 9 cr]. Prereq–3104 or equiv)
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in *Class Schedule*.

Ger 5510. Topics in Contemporary German Culture. (3 cr [max 9 cr]. Prereq–3104 or equiv)
A single topic of contemporary German culture explored in depth.

Ger 5610. German Literature in Translation. (3 cr [max 9 cr]. Prereq–No knowledge of German required; cr toward major or minor requires reading in German)
Study in depth of authors or topics from various periods in German literature. Requires no knowledge of German.

Ger 5630. Topics in German Cinema. (3 cr [max 9 cr]. Prereq–3xxx film course or #)
Topics chosen may focus on specific directors, genres, film production or reception, and/or other formal, theoretical, historical, or political issues.

Ger 5711. History of the German Language I. (3 cr. Prereq–¶3012)
Historical development of German from the beginnings to 1450.

Ger 5712. History of the German Language II. (3 cr. Prereq–5711)
Historical development of German from 1450 to 2000.

Ger 5721. Introduction to Middle High German. (3 cr)
Introduction to Middle High German language and literature. Study of grammar through formal description of Middle High German phonology, morphology, and syntax. Normalized MHG texts read.

Ger 5722. Middle High German: Advanced Readings. (3 cr. Prereq–5721)
Acquisition of fluency in reading Middle High German normalized as well as non-normalized texts, both poetry and prose.

Ger 5731. Old High German I. (3 cr)
Study of the monuments of Old High German. Detailed investigation of Old High German in comparison with the other Germanic languages.

Ger 5732. Old High German II. (3 cr. Prereq–5731)
Study of the monuments of Old High German. Detailed investigation of Old High German in comparison with the other Germanic languages.

Ger 5734. Old Saxon. (3 cr)
Study of the poetry of Old Saxon. Detailed investigation of Old Saxon in comparison with the other Old Germanic languages.

Ger 5740. Readings in Philology. (3 cr [max 9 cr])
Philological analysis of a chosen text in any medieval Germanic language.

Ger 5771. Early New High German. (3 cr)
Reading and analysis of Early New High German texts. Formal description of Early New High German phonology, morphology, syntax.

Ger 5781. Varieties of Modern German. (3 cr. Prereq–5101)
Lexical, syntactic, and phonological variations examined using contemporary methods of dialectology and sociolinguistics.

Ger 5801. German Script Since 1500: Readings. (3 cr)
Handwriting and printed book scripts will be read, 1500-2000.

Ger 5993. Directed Studies. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

German, Scandinavian, and Dutch (GSD)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

GSD 3451V. Honors Major Project Seminar. (4 cr; A-F only. Prereq–Honors)
Major project under supervision of faculty member. Oral exam based on project.

GSD 3451W. Major Project Seminar. (4 cr; A-F only)
Students prepare major project under supervision of faculty member.

GSD 5103. Teaching of Germanic Languages. (4 cr)
Second language acquisition theory, methods, testing, and technology applicable to teaching of modern Germanic languages.

Gerontology (Gero)

Graduate School

Gero 5105. Multidisciplinary Perspectives on Aging. (3 cr)
Sociological, psychological aspects of aging; theories of aging; death and bereavement; issues and problems of older adults in America; human services and their delivery systems (health, nutrition, long-term care, education); public policy and legislation; environment and housing; retirement.

Gero 5110. Biology of Aging. (3 cr; A-F only)
Biological changes that occur with aging. Methods for studying aging, descriptions of population aging, theories on how/why we age. Process of aging in each body system, variation between individuals/populations. Clinical implications of biological changes with age. Guest lecturers from different disciplines.

GLBT Studies (GLBT)

College of Liberal Arts

GLBT 1001. Introduction to GLBT Studies. (3 cr)
History of contemporary GLBT-identified communities. Terms of theoretical debates regarding sexual orientation, identity, and experience. Analyzes problems produced and insights gained by incorporating GLBT issues into specific academic, social, cultural, and political discourses.

Global Studies (GloS)

Institute of International Studies

College of Liberal Arts

GloS 1015W. Introduction to Global History Since 1950. (4 cr)
Global History in Information Age. East-West divisions during Cold War: North-South relations in global economy. Emerging consciousness of global systems. Issues of human rights, labor migration, environmental degradation, and indigenous peoples. Emphasizes comparison of cases from Asia, Africa, Latin America.

GloS 1200. Global Studies Practicum. (3 cr [max 6 cr]; A-F only)
Exploratory experience in one part of the world. Brief exposure to another culture. Preparation for learning the language of the area visited.

GloS 1201. Exploring Global Studies. (1 cr [max 1 cr]; S-N only. Prereq–Δ)
Global studies, study abroad, and experiential learning. International film series, discussions with faculty, exposure to international media resources. Introduction to special language learning opportunities. Tied to Global Studies House residential experience.

GloS 1909W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule.*

GloS 3003. Cultural Anthropology. (3 cr. §Anth 3003. Prereq–Anth 1003 or #)
Marxist/feminist theories of culture. Culture and language/discourse. Psychological anthropology. Culture and transnational processes. May include field research, politics of ethnographic knowledge.

GloS 3101. Theoretical Approaches to Global Studies. (4 cr; A-F only. §3101H)
Introduction to social, political, economic, cultural, historical processes shaping contemporary global phenomena. Topics may include nationalism, colonialism, cultural production, environmental sustainability, globalization of economy, migration/diasporas, global conflict/cooperation.

GloS 3101H. Theoretical Approaches to Global Studies. (4 cr; A-F only. §3101)
Social, political, economic, cultural, historical processes shaping contemporary global phenomena. Topics may include nationalism, colonialism, cultural production, environmental sustainability, globalization of economy, migration/diasporas, global conflict/cooperation.

GloS 3102. Research Methods in International Relations. (3 cr)
Provides skills for the competitive work place and academic research. Information resources and methods for researching topics in international relations including both traditional print and new electronic forms of information.

GloS 3103. Colonialism and Modernity. (3 cr. Prereq–[3101, 3144] or #)
How modern world has been constituted by colonial encounter. Role of colonialism in construction of west. Images of non-western societies. Modernity in colonial/postcolonial societies. Problems/potential of universal categories such as democracy, gender, history, human rights. Globalization at the margins.

GloS 3144. Knowledge, Power, and the Politics of Representation in Global Studies. (4 cr. Prereq–6 cr in social sciences including [Geog 1301 or Hist 1015 or Hist 1019 or Hist 1012 or Hist 1018 or Pol 1025])
Introduction to theoretical issues. Power and production of knowledge about world regions. Knowledge, power, and political identities in contemporary world. Colonialism, nationalism, and modernity in shaping academic disciplines.

GloS 3301. Environment and Empire. (3 cr; A-F only. Prereq–[3101, 3144] or #)
Introduction to key issues in environmental history. Emphasizes global/colonial processes that have made modern environment. Global spread of diseases. Modern remaking of world's flora/fauna. Idea of nature. New technologies and the environment. Conservationist ideology.

GloS 3302. Debating "Development": Contested Visions. (3 cr; A-F only. §5302. Prereq–[3101, 3144] or #)
Introduction to various radical critiques of idea/practice of "development." Overview of debates over development. Diverse vocabularies (Marxist, feminist, poststructuralist, ecological) that drive the debates.

GloS 3401. International Human Rights Law. (3 cr; A-F only. Prereq–[3101, 3144] or #)
Issues, procedures, advocacy strategies regarding promotion/protection of international human rights. Students analyze recent case studies of human rights violations in light of evolving laws, enforcement mechanisms.

GloS 3402. Human Rights Internship. (3 cr; A-F only. Prereq–[3101, 3144] or #)
Hands-on experience in one of many Twin Cities area organizations engaged in promoting/protecting international human rights. Students work 100 hours in non-governmental organization. Substantive background on human rights laws/procedures, organizational theory/management information about human rights organizations.

GloS 3550V. Honors Course: Supervised Research Paper. (4 cr)
Supervised research paper.

GloS 3552H. Honors Seminar: Making of the Modern World. (3 cr; A-F only. Prereq–MacArthur Program or [IntR, honors])
Interaction across ecological frontiers, changing power relations, restructuring of systems of production, creation of new cultures/identities.

GloS 3553. Honors: Change in the Contemporary Global Order. (3 cr; A-F only. Prereq–#)
Important issues of global change: population growth, human migration; human relations with physical environment; struggles for popular power, sustainable democratic institutions; relations/conditions of work; cultural representations of social identities. Attention to U.S.-Mexican arena.

GloS 3558H. Honors: Junior Research Seminar. (3 cr; A-F only. Prereq–Jr, honors, [IntR or global studies] major)
Theoretical perspectives/methods available to researchers in international studies.

GloS 3602. Other Worlds: Globalization and Culture. (3 cr; A-F only. Prereq–[3101, 3144] or #)
Interconnectedness of world. Considering not one world, but many. Colonialism, consumption, diasporic conditions, global media, nationalism, supra-national governance. How globalization is experienced/contested locally/specifically.

GloS 3605. From Printing Press to Internet: Media, Communications, and History. (3 cr; A-F only)
Print public sphere in 17th, early 18th century. Political conflicts over freedom of press in 18th, 19th century. Emergence of advertising, public relations industries in 20th century. Significance of broadcast, computer network technologies for democratic political systems.

GloS 3620. Foreign Language News Coverage of International Events. (1 cr. Prereq–IntR major, completion of college language requirement in language used for the course)
Compares coverage of current news in selected foreign language newspapers with coverage in a U.S. paper such as The New York Times.

GloS 3645. Islamic World. (3 cr; A-F only. §Geog 3145)
Foundation of Islam in Arabian Peninsula, its spread to Asia and Africa. Islamic civilization, influence on Europe before rise of capitalism. Rise of Capitalist Europe, colonization of Islamic World Islamic resurgence and post-colonial World. State-society and development. Culture/conflict in Moslem societies. Gender and Islam. Islamic World and the West. Moslems in North America and Europe. Case studies.

GloS 3900. Topics in Global Studies. (3 cr [max 9 cr])
Topics vary every semester. See *Class Schedule.*

GloS 3910. Topics in East Asian Studies. (1-3 cr)
Selected topics in history not covered in regular courses, covering more than one geographic area/time period. Taught as staffing/demand exist.

GloS 3920. Topics in European Studies. (3 cr)
Topics vary. See *Class Schedule.*

GloS 3930. Topics in Latin American Studies. (3 cr)
Topics vary. See *Class Schedule.*

GloS 3940. Topics in Middle Eastern Studies. (3 cr)
Description varies with topic title.

GloS 3950. Topics in Russian Area Studies. (3 cr)
Description varies with topic title.

GloS 3960. Topics in South Asian Studies. (3 cr)
Topics vary. See *Class Schedule*.

GloS 3961. Culture and Society of India. (3 cr. §Anth 3023)
Contemporary society/culture in South Asia from an anthropological perspective. Nationalism, postcolonial identities. Media, public culture. Gender, kinship/politics. Religion, ethnicity, Indian diaspora.

GloS 3981W. Major Project Seminar. (3 cr; A-F only)
Supports senior project requirement by allowing students to formulate their own research questions, select a topic, develop and produce a 25-30 page undergraduate research paper.

GloS 3993. Directed Study. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

GloS 4504W. Senior Project. (3 cr. Prereq–Sr or #)
Research methods, writing skills, and bibliography related to field of study.

GloS 4801. International Development: Critical Perspectives on Theory and Practice. (4 cr; A-F only. Prereq–Δ)
Interdisciplinary approaches to development. Assumptions, competing paradigms, analysis of policies, projects, problems. Globalization, societal crisis, indigenous alternatives to dominant paradigm. Partially taught in separate sections to deepen understanding of particular topic (e.g., environment, health, education).

GloS 4802. Cross-Cultural Perspectives on Work. (4 cr; A-F only. Prereq–❑)
Intercultural communication concepts/skills. U.S. cultural/value system. Stages of adjustment. Coping strategies for crossing cultural boundaries. Host-country cultural characteristics. Emphasizes work, family, community, views of development.

GloS 4900. Senior Seminar in Global Studies. (3 cr; A-F only. Prereq–[3101, 3144, global studies major] or #)
Globalization, nationalism, colonialism, cultural production, environmental sustainability, globalization of economy, migration, diasporas, global conflict/cooperation, human rights. Students examine theoretical debates and cutting edge scholarship and develop their own research projects. Capstone course.

GloS 4900H. Honors: Senior Seminar in Global Studies. (3 cr; A-F only. Prereq–[3101, 3144, honors student, global studies major] or #)
Globalization, nationalism, colonialism, cultural production, environmental sustainability, globalization of economy, migration, diasporas, global conflict/cooperation, human rights. Students examine theoretical debates and cutting edge scholarship and develop their own research projects. Capstone course.

GloS 4940. Topics in Asian History. (1-4 cr [max 16 cr])
Selected topics in Asian history not covered in regular courses.

GloS 4960. Advanced Topics in South Asian Studies. (3 cr. Prereq–Jr or sr or grad or #)
Topics vary. See *Class Schedule*.

GloS 5103. Colonialism and Modernity. (3 cr; A-F only. Prereq–[3101, 3144] or #)
How modern world has been constituted by colonial encounter. Role of colonialism in construction of the west. Images of non-western societies. Modernity in colonial/postcolonial societies. Problems/potential of universal categories such as democracy, gender, history, human rights. globalization at the margins.

GloS 5114. International Perspectives—U.S.-Mexico Border Cultures. (3 cr. Prereq–Grad student)
The relations of Mexico and the United States from an international perspective with a central focus on the cultural interchange in the border lands between the two countries. Uses both literary and historical materials.

GloS 5301. Environment and Empire. (3 cr; A-F only. Prereq–[3101, 3144] or #)
Key issues in environmental history. Emphasizes global/colonial processes that have made modern environment. Global spread of diseases, modern remaking of world's flora/fauna, idea of nature. New technologies and the environment. Conservationist ideology.

GloS 5602. Other Worlds: Globality and Culture. (3 cr; A-F only. Prereq–[3101, 3144, grad student] or #)
Interconnectedness of world. Considering not one world, but many. Colonialism, consumption, diasporic conditions, global media, nationalism, supra-national governance. How globality is experienced/contested locally/specifically.

GloS 5603. Socialist/Post-socialist Transformations. (3 cr; A-F only)
Transformations underway in post-socialist societies of Eastern Europe, former Soviet Union. Ramifications of abandonment of state socialism, introduction of market relations. Effect of former system, new market system on cultural institutions/identities.

GloS 5900. Topics in Global Studies. (0-3 cr)
Proseminar. Selected issues in global studies. Topics specified in *Class Schedule*.

GloS 5910. Topics in East Asian Studies. (1-3 cr)
Description varies with topic title.

GloS 5920. Topics in European Studies. (3 cr)
Description varies with topic title.

GloS 5930. Topics in Latin American Studies. (3 cr)
Description varies with topic title.

GloS 5940. Topics in Middle Eastern Studies. (3 cr)
Description varies with topic title.

GloS 5950. Topics in Russian Area Studies. (3 cr)
Description varies with topic title.

GloS 5960. Topics in South Asian Studies. (3 cr)
Description varies with topic title.

GloS 5993. Directed Studies. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study. Open to qualified students for one or more semesters.

GloS 5994. Directed Research. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Qualified students work on a tutorial basis.

Greek (Grk)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Grk 1001. Beginning Classical Greek I. (5 cr)
Introduction to classical Greek.

Grk 1002. Beginning Classical Greek II. (5 cr. Prereq–1001 or equiv)
Continuing work on Greek grammar and syntax; readings from classical Greek authors including Herodotus and Aristophanes.

Grk 1111H. Honors Course: Beginning Classical Greek. (3 cr. §1001. Prereq–¶1112, [honors or high ability as indicated by high school transcript])
Intensive Classical Greek covering material normally taught over two semesters.

Grk 1112H. Honors Course: Classical Greek, Recitation. (3 cr. §1002. Prereq–¶1111, [honors or high ability as indicated by high school transcript])
Drills, composition exercises.

Grk 3111. Intensive Classical Greek. (3 cr. §1001, §1002, §1111. Prereq–¶3112; previous exper in another foreign language desirable)
Intensive introduction to classical Greek covering two semesters of material in one semester. Undergraduates in this course must also register for 3112 when taking this class.

Grk 3112. Intensive Classical Greek, Recitation. (3 cr. §1001, §1002, §1112. Prereq–¶3111; previous exper in another foreign language desirable)
Drills and composition exercises to help students learn classical Greek. Students must also register for 3111 when taking this course.

Grk 3113. Attic Authors. (4 cr. Prereq–1002 or 1111 or 3111 or 3 yrs high school Greek or Δ)
Selections from classical Attic authors.

Grk 3114. Ionic Authors. (4 cr. Prereq–3113 or Δ)
Students progress from intermediate to advanced Greek reading while exploring the world of Herodotus and Homer.

Grk 3120. Greek New Testament. (3 cr [max 6 cr]. Prereq–3113 or #)
Readings from the Gospels, epistles of Paul, and related literature. Emphasis on gaining proficiency in reading the Greek New Testament. Selections will vary.

Grk 3310. Advanced Undergraduate Greek: Oratory. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
One or more appropriate authors studied during each course offering.

Grk 3320. Advanced Undergraduate Greek: Tragedy. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Advanced reading in Greek tragedy.

Grk 3330. Advanced Undergraduate Greek: Comedy. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Advanced readings in Greek comedy.

Grk 3340. Advanced Undergraduate Greek: History. (3 cr [max 9 cr]. Prereq–3114 or 3 yrs HS Greek or Δ)
Advanced readings from the Greek historians; traditions of Greek historiography.

Grk 3350. Advanced Undergraduate Greek: Philosophy. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Read one or more works of Plato or Aristotle in the original Greek and find out what they really mean. Texts vary with each offering.

Grk 3360. Advanced Undergraduate Greek: Religious Texts. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Reading and discussion of religious texts from Greek antiquity. Selections vary with each course offering.

Grk 3370. Advanced Undergraduate Greek: Epic. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Reading of classical Greek epic on an advanced level.

Grk 3380. Advanced Undergraduate Greek: Lyric. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Selections from Greek lyric poets.

Grk 3390. Advanced Undergraduate Greek: Romance. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Selections from the Hellenistic Romances.

Grk 3440. Advanced Undergraduate Greek: Later Greek Authors. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Selected topics in later Greek literature, especially Byzantine prose.

Grk 3450. Advanced Undergraduate Greek: Classical Authors. (3 cr [max 9 cr]. Prereq–3114 or 3 years HS Greek or Δ)
Selected topics in classical Greek literature; topics specified in *Class Schedule*.

Grk 3951. Major Project. (4 cr. Prereq–Greek-Latin or Greek major, three 3xxx Greek courses or #)
Research project using documents and other sources from the ancient world. Students select project in consultation with a faculty member who directs the research and writing.

Grk 3960H. Honors Course: Advanced Undergraduate Greek Reading. (3 cr [max 12 cr]. Prereq–Regis in honors program or high ability as indicated by transcript)
Student attends Greek 33xx, 3440, 3450 and does additional work for honors credit.

Grk 3993. Directed Studies. (1-4 cr)

Grk 5012. Prose Composition. (3 cr)

Moving step by step through Ancient Greek grammar, starting with simple sentences and progressing to complex ones. Course ends with students translating short passages of modern English prose into Greek.

Grk 5013. Advanced Composition. (3 cr. Prereq–5012 or #)
Detailed study of English-to-Greek verse composition and/or the writing styles of individual Greek authors.

Grk 5032. Text Criticism. (3 cr. Prereq–Greek 3114)
Theory and practice. Elements of paleography and manuscript study. Basic tools for analyzing a textual apparatus with some independence; constructing a critical edition of a literary text.

Grk 5121. Biblical and Patristic Greek. (3 cr. Prereq–3114 or 3120)
Septuagint, Philo, Josephus, New Testament, Apostolic Fathers, and other patristic literature to 5th century C.E. Reading and discussion of selected texts in the major genres.

Grk 5310. Greek Literature: Oratory. (3 cr [max 9 cr])
One or more appropriate authors studied in a given course.

Grk 5320. Greek Literature: Tragedy. (3 cr [max 9 cr])
Reading of Greek tragedy on advanced level.

Grk 5330. Greek Literature: Comedy. (3 cr [max 9 cr])
Advanced readings in Greek comedy.

Grk 5340. Greek Literature: History. (3 cr [max 9 cr])
Advanced readings from the Greek historians; traditions of Greek historiography.

Grk 5350. Greek Literature: Philosophy. (3 cr)
Read one or more works of Plato or Aristotle in the original Greek and find out what they really mean. Selections vary with each offering.

Grk 5360. Literature: Religious Texts. (3 cr [max 9 cr])
Reading and discussion of religious texts from Greek antiquity, such as the Homeric Hymns, cultic verse, aretalogy, sacred tales, oracle texts.

Grk 5370. Greek Literature: Epic. (3 cr [max 9 cr])
Reading of classical Greek epic on an advanced level.

Grk 5380. Greek Literature: Lyric. (3 cr [max 9 cr])
Selections from the Greek lyric poets.

Grk 5390. Greek Literature: Romance. (3 cr [max 9 cr])
Selections from the Hellenistic Romances of, e.g., Chariton, Longus.

Grk 5440. Greek Literature: Later Authors. (3 cr [max 9 cr])
Selected topics in later Greek literature, especially Byzantine prose.

Grk 5450. Greek Literature: Classical Authors. (3 cr [max 9 cr])
Selected topics in classical Greek literature; topics specified in *Class Schedule*.

Grk 5621. Greek Paleography. (3 cr)
Analysis of various hands used in Greek manuscripts with attention to date and provenance; history of the transmission of Greek literature.

Grk 5715. Introduction to the Historical-Comparative Grammar of Greek and Latin. (3 cr. Prereq–# or 2 yrs college Latin)
Historical and comparative grammar of Greek and Latin from their Proto-Indo-European origins to the classical norms.

Grk 5716. History of Greek. (3 cr. Prereq–Grk/Lat 5715 or equiv, 2 yrs Greek)
Reading and formal analysis of documents illustrating the evolution of the Greek language from Mycenaean to modern times.

Grk 5993. Directed Studies. (1-4 cr [max 18 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Grk 5994. Directed Research. (1-12 cr [max 18 cr]. Prereq–#, Δ, ❑)
Supervised original research on topic chosen by student.

Grk 5996. Directed Instruction. (1-12 cr [max 20 cr]. Prereq–#, Δ, ❑)
Supervised teaching internship.

Health Informatics (HInf)

Department of Laboratory Medicine and Pathology

Medical School

HInf 5430. Health Informatics I. (3 cr; A-F only)
History/challenges of health informatics. Structure of health care delivery system. Computerized patient records. Clinical information systems. Basics of information, computation, communication. Data management in health settings. Clinical information exchange. Managing information technology as strategic resources for healthcare organizations.

HInf 5431. Health Informatics II. (3 cr)
Clinical decision analysis, support systems. Clinical monitoring. Signal processing. Image analysis. modeling/simulation. Databases supporting clinical/research efforts. Informatics support for basic research. Evaluation methodologies. Computational biology.

HInf 5436. Seminar. (1 cr; S-N only)
Presentation and discussion of research problems, current literature and topics of interest in Health Informatics.

HInf 5494. Topics in Health Informatics. (1-6 cr)
Individual or group studies in health informatics.

HInf 5496. Internship in Health Informatics. (1 cr [max 3 cr]; S-N only. Prereq–5430, 5431, #)
Practical industrial experience not directly related to student's normal academic experience.

Hebrew (Hebr)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Hebr 1001. Beginning Hebrew I. (5 cr)
For beginners whose goal is biblical or post-biblical Jewish studies, or modern Israeli Hebrew. Leads to speaking, listening comprehension, and reading/writing Hebrew. Emphasizes communication proficiency. Cultural materials are incorporated.

Hebr 1002. Beginning Hebrew II. (5 cr. Prereq–1001 or #)
Continuation of 1001. For students whose goal is biblical or post-biblical Jewish studies, or Modern Israeli Hebrew. Leads to speaking, listening comprehension, reading, and writing Hebrew with emphasis on communication proficiency. Cultural materials incorporated.

Hebr 1012. High Performance Hebrew I. (4 cr. Prereq–Previous exposure to Hebrew or ability to work at an intensive pace)
Similar to Hebrew I. Intended for those who may have had previous exposure to the language but need a full presentation of course materials and for honors students and highly motivated beginners.

Hebr 1013. High Performance Hebrew II. (4 cr. Prereq–1012 or #)
Similar to Hebrew II. Intended for those who may have had previous exposure to the language but need a full presentation of course materials and for honors students and highly motivated beginners.

Hebr 1104. Basics of Biblical Hebrew I. (4 cr)
Basic grammar/syntax preparatory to reading simple narrative texts in Bible. Multiple approaches to problems/issues in biblical scholarship.

Hebr 1105. Basics of Biblical Hebrew II. (4 cr. Prereq–Hebr 1104)
Progression to more sophisticated reading of narrative, prophetic, and legal texts. Presentation and discussion of multiple approaches to problems and issues in biblical scholarship.

Hebr 3011. Intermediate Hebrew I. (5 cr. Prereq–1002 or qualified fr or #)
Prepares students for CLA language requirement. Strengthens and extends proficiency in speaking, reading, writing, and comprehension of modern Hebrew. Read and discuss prose, poetry, news, and film. Important features of biblical and classical Hebrew introduced. Taught primarily in Hebrew.

Hebr 3012. Intermediate Hebrew II. (5 cr. Prereq–3011 or qualified fr or #)
Extensive reading of simplified modern Hebrew prose selections. Discuss poetry, newspaper, film, and TV in Hebrew. Israeli cultural experiences. Hone composition, listening comprehension, and speaking skills to prepare for proficiency exams. Basic mastery of biblical prose and simple poetic texts. Taught in Hebrew.

Hebr 3015. Advanced Modern Hebrew I. (3 cr. Prereq–3012)
Advanced studies in a variety of genres and media including fiction, poetry, drama, film, and journal. Emphasis on expanded oral and written self expression. Materials from several periods are used to prepare for future specialized study. Taught in Hebrew.

Hebr 3016. Advanced Modern Hebrew II. (3 cr. Prereq–3015 or qualified fr or #)
A continuation of 3015. Emphasis on expanded oral and written self expression. Samples a variety of Hebrew periods to prepare for specialized study. Studies utilize a variety of genres and media including fiction, poetry, drama, film, and journal. Taught in Hebrew.

Hebr 3111. Rabbinic Texts I. (3 cr. Prereq–3012 or #)
Rabbinic legal and homiletical texts. Rabbinic Bible commentaries of Rashi, Rashbam, Ibn Ezra, Nachmanides, and others. Sources in Talmud and Midrash. Contributions of commentators and their methods. Recommended for students of biblical literature.

Hebr 3112. Rabbinic Texts II. (3 cr. Prereq–3111 or #)
Selections from Mishnah, Gemara, Midrash and codes.

Hebr 3122. Medieval Hebrew Literature I. (3 cr. Prereq–3012 or #)
Readings in medieval Hebrew philosophical texts including Sa'adia Gaon, Judah Halevi, Maimonides, and others.

Hebr 3123. Medieval Hebrew Literature II. (3 cr. Prereq–3012 or #)
Medieval Hebrew religious and secular poetry. Representative poets from the Middle Ages: Yanai, Kalir, Ibn Gabirol, Halevi, others.

Hebr 3131. Talmudic Texts. (3 cr. Prereq–3012 or 3016 or #)
Study of a tractate of Talmud Babli and Yerushalmi, Mishnah, Tosefta. Literary critical methods and attention to Talmudic Aramaic. Redactional and historical problems.

Hebr 3200. Topics in Biblical Studies: A Book of the Bible. (3 cr [max 9 cr]. Prereq–3012 or qualified fr or #; ability to speak Hebrew not required)
Scientific study of a book of the Bible. Both modern scholarly methods and research, and medieval exegesis are utilized. Analysis of selected text.

Hebr 3201. Readings in Biblical Hebrew I. (3 cr. Prereq–1002, 1105 or #; ability to speak Hebrew not required)
Study text of the Hebrew Bible and learn to use basic research tools and commentaries. Close reading of narrative biblical texts. Develop reading fluency and familiarity with methods of research in biblical studies.

Hebr 3202. Readings in Biblical Hebrew II. (3 cr.

Prereq–1002, 1105, 3201 or #; ability to speak Hebrew not required)
Study text of the Hebrew Bible and learn to use basic research tools and commentaries. Close reading of narrative biblical texts. Develop reading fluency and familiarity with methods of research in biblical studies.

Hebr 3301. Modern Hebrew Prose (Survey of Hebrew Essays and Journals). (3 cr. Prereq–3016 or #)
Works from 19th- and 20th-century Hebrew essayists. Jewish nationalism, literary criticism, social and political issues, religion, and philosophy. Readings from encyclopedia articles and journals.

Hebr 3302. Modern Literary Prose and Poetry. (3 cr. Prereq–3016 or #)
Close reading of contemporary poetry, prose, fiction, and plays. Methods of literary analysis. Established writers and new writers, particularly women. Themes include: human relations, disintegration of traditional society, militarism, alienation, genocide, Jews and Arabs. Entirely in Hebrew.

Hebr 3951. Major Project. (4 cr. Prereq–Hebr major, three 3xxx Hebrew courses or #)
Research project using primary and secondary sources. Students select project in consultation with a faculty member who directs the research and writing.

Hebr 3980. Directed Instruction. (1-4 cr. Prereq–#)
For students interested in careers in Hebrew education. Observe and discuss classes. Gradually increased participation in preparing and presenting instructional materials to a beginning Hebrew class. Evaluation of materials, teaching techniques. Seminars with instructor and staff on language teaching issues.

Hebr 3990. Topics in Hebrew Studies. (1-4 cr [max 12 cr]. Prereq–#, Δ)
Historical, linguistic, literary, religious, or humanistic study of Hebrew society and culture. Approach and method of study varies with topic.

Hebr 4001. Beginning Hebrew I. (2 cr. §1001. Prereq–Grad student or passing score on GPT)
Leads to speaking, listening comprehension, reading/writing Hebrew. Emphasizes communication proficiency. Cultural materials are incorporated.Meets concurrently with 1001.

Hebr 4002. Beginning Hebrew II. (2 cr. §1002. Prereq–[1001 or equiv], [grad student or passing score on GPT])
Leads to speaking, listening comprehension, reading/writing Hebrew. Emphasizes communication proficiency. Incorporates cultural materials. Meets concurrently with 1002.

Hebr 4104. Basics of Biblical Hebrew I. (2 cr. §1104. Prereq–grad student or passing score on GPT)
Basic grammar/syntax preparatory to reading simple narrative texts in Bible. Multiple approaches to problems/issues in biblical scholarship. Meets with 1104.

Hebr 4105. Basics of Biblical Hebrew II. (2 cr. §1105. Prereq–[1104 or 4104], [grad student or passing score on GPT])
Progression to more sophisticated reading of narrative, prophetic, and legal texts. Presentation/discussion of multiple approaches to problems/issues in biblical scholarship. Meets with 1105.

Hebr 5992. Directed Readings. (1-4 cr [max 12 cr]. Prereq–3012 or #)
Guided individual reading or study.

Hindi (Hndi)

Department of Asian Languages and Literatures
College of Liberal Arts

Hndi 1001. Introduction to Conversational Hindi. (3 cr; A-F only)
Advanced grammatical structures, oral forms, new vocabulary reinforced from lessons around everyday life situations. Oral/written drills, reading for comprehension, audio-visual work.

Hndi 1101. Beginning Hindi. (5 cr)
Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Hndi 1102. Beginning Hindi. (5 cr. Prereq–1101)
Basic listening, speaking, reading, and writing skills. Emphasizes communicative competence.

Hndi 3101. Beginning Hindi. (5 cr)
Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Hndi 3102. Beginning Hindi. (5 cr)
Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Hndi 3131. Intermediate Hindi. (5 cr. Prereq–1102 or #)
Development of reading, writing, speaking, and listening skills. Grammar review, some basic compositions and oral presentations.

Hndi 3132. Intermediate Hindi. (5 cr. Prereq–3131 or #)
Development of reading, writing speaking, and listening skills. Grammar review, some basic compositions and oral presentations.

Hndi 4161. Advanced Hindi. (4 cr. Prereq–3132 or #)
Continued emphasis on the development of communication skills, i.e., the ability to comprehend both written and spoken texts, and to speak, read, and write in Hindi beyond the intermediate level.

Hndi 4162. Advanced Hindi. (4 cr. Prereq–4161 or #)
Continued emphasis on the development of communication skills, i.e., the ability to comprehend both written and spoken texts, and to speak, read, and write in Hindi, beyond the intermediate level.

Hndi 5040. Readings in Hindi Text. (2-4 cr [max 12 cr]; A-F only. Prereq–4162 or equiv or #)
Students read authentic materials of various types to improve reading/speaking ability. Topics specified in *Class Schedule*.

Hndi 5710. Topics in Hindi Language, Literature, and Culture. (4-5 cr)
Topics in Hindi literature or the linguistic structure of Hindi.

Hndi 5990. Directed Research. (3-5 cr. Prereq–#, Δ, ❑)

Hndi 5993. Directed Readings. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study of modern Hindi texts.

History (Hist)

Department of History
College of Liberal Arts

Hist 1011V. Honors: World History. (4 cr)
World civilizations in 1550. Compares religion, politics, economy, society, culture. Examples from Africa, Europe, Asia, the Americas.

Hist 1011W. World History. (4 cr. §1017)
World civilizations from prehistory to 1550, comparing religion, politics, economy, society, and culture. Examples drawn from Africa, Europe, Asia, and the Americas.

Hist 1012V. Honors: World History. (4 cr)
World history from 1450 to 1920s. Comparisons of and connections among various cultures. Emphasizes analyzing primary documents to show how historical knowledge is produced. Case studies. Web-enhanced.

Hist 1012W. World History: The Age of Global Contact. (4 cr. §1018)
Case study approach to world history from 1450 to 1920s. Comparisons of and connections among various cultures. Emphasis on analyzing primary documents to show how historical knowledge is produced. Course is Web-enhanced.

Hist 1015V. Introduction to Global History Since 1950. (4 cr; A-F only. §1015, §GloS 1015, §GloS 1015H)
Global History in Information Age. East-West divisions during Cold War: North-South relations in global economy. Emerging consciousness of global systems. Issues of human rights, labor migration, environmental degradation, indigenous peoples. Emphasizes comparison of cases from Asia, Africa, Latin America.

Hist 1015W. Introduction to Global History Since 1950. (4 cr; A-F only. §1015H, §GloS 1015, §Glos1015H)
Global History in Information Age. East-West divisions during Cold War: North-South relations in global economy. Emerging consciousness of global systems. Issues of human rights, labor migration, environmental degradation, indigenous peoples. Emphasizes comparison of cases from Asia, Africa, Latin America.

Hist 1017. World History. (3 cr. §1011)
World civilizations from prehistory to 1550, comparing religion, politics, economy, society, and culture. Examples drawn from Africa, Europe, Asia, and the Americas.

Hist 1018. World History: The Age of Global Contact. (3 cr. §1012)
Case study approach to world history from 1450 to 1920s. Comparisons of and connections among various cultures. Emphasis on analyzing primary documents to show how historical knowledge is produced. Course is Web-enhanced.

Hist 1019. Introduction to Global History Since 1950. (3 cr. §1013W, §1013V, §GloS 1013W, §GloS 1013V)
Global History in Information Age. East-West divisions during Cold War: North-South relations in global economy. Emerging consciousness of global systems. Issues of human rights, labor migration, environmental degradation, indigenous peoples. Emphasizes comparison of cases from Asia, Africa, Latin America.

Hist 1026. Western Civilization from its Origins to ca 1500. (3 cr. §1031)
Western civilization from its origins in ancient Middle East to Europe in 1500. Law, religion, governments, history of ideas, social organization.

Hist 1027. Western Civilization from 1500 to Present. (3 cr. §1032)
Role of European civilization in world history from early 16th century to present. Broad chronological periods/themes.

Hist 1031V. Honors: Survey of Western Civilization From Its Origins to ca 1500. (4 cr)
The development of western civilization from its origins in the ancient Middle East to Europe in 1500. Law, religion, government, history of ideas, social organization.

Hist 1031W. Western Civilization from its Origins to ca 1500. (4 cr. §1026)
Western civilization from its origins in ancient Middle East to Europe in 1500. Law, religions, governments, history of ideas, social organization.

Hist 1032V. Honors: Western Civilization From 1500 to Present. (4 cr)
Role of European civilization in world history from early 16th century to present. Broad chronological periods/themes.

Hist 1032W. Western Civilization from 1500 to Present. (4 cr)
Role of European civilization in world history from early 16th century to present. Broad chronological periods/themes.

Hist 1301V. Honors: U.S. History to 1880. (4 cr)
America to 1880.

Hist 1301W. U.S. History to 1880. (4 cr)
America to 1880.

Hist 1302V. Honors: U.S. History 1880 to Present. (4 cr)
America 1880 to present.

Hist 1302W. U.S. History: 1880 to Present. (4 cr. §1308)
Modern America from 1880 to the present.

Hist 1307. American History, Through Reconstruction. (3 cr)
Survey of political, economic, and social history of the United States. Emphasizes forces that resulted in the emergence of Modern America. Colonial early national period, from the Revolution through Civil War and Reconstruction.

Hist 1308. U.S. History: 1880 to Present. (3 cr. §1302)
Modern America from 1880 to the present.

Hist 1904. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule.*

Hist 1905. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule.*

Hist 1907W. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule.*

Hist 1908W. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule.*

Hist 1909W. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule.*

Hist 3051. Ancient Civilization: Near East and Egypt. (3 cr)
A broad survey of ancient Near Eastern and Egyptian history and culture from the prehistoric to the rise of Persia around 550 B.C.

Hist 3052. Ancient Civilization: Greece. (3 cr)
A broad survey of ancient Greek culture and history from the third millennium B.C. to the death of Alexander the Great in 323 B.C.

Hist 3053. Ancient Civilization: Rome. (3 cr)
A broad survey of the culture and history of Rome from its origins to the decline and fall of the Roman Empire in the third and fourth centuries A.D.

Hist 3101. Introduction to Medieval History. (3 cr)
Europe from the decline of Rome to the early Renaissance; politics, institutions, society, economy, and culture of the Middle Ages.

Hist 3151W. British History to the 17th Century. (4 cr)
The making of the English nation: Anglo-Saxons and Normans; development of English law and Parliament; Reformation and constitutional crisis; early Wales, Scotland, and Ireland.

Hist 3152W. British History From the 17th Century. (4 cr)
Civil War, Revolution and constitutional settlement; industrialization and growth of democracy; rise and decline of British Empire.

Hist 3211. History of Sexuality. (3 cr; A-F only)
History of sexuality in Europe, from ancient Greece to present. Plato's philosophy of love, St. Augustine's conception of sin, prostitution in 15th century, sexual science of Enlightenment. Industrial revolution and homosexual subcultures. Rape scares and imperialism. Eugenics and Nazi Germany.

Hist 3244. History of Eastern Europe. (3 cr)
History of the peoples of the region from their origins to modern times, culture and society in the Middle Ages; Golden Age of Eastern Europe; loss of independence; nationalism and formation of national states; fascism and World War II, Jews in Eastern Europe; communist and post-communist periods.

Hist 3251. Europe and the American Challenge in the 20th Century. (3 cr; A-F only)
European response to social, political, cultural influence of the United States in Europe in 20th century. Historical studies, diplomatic memoirs, literature, films, film criticism.

Hist 3281. European Intellectual History: the 18th and 19th Centuries. (3 cr)
The first of a two-semester course dealing with logical, philosophical, and methodological issues in the historical, social, and natural sciences from the late 17th to the mid-19th century. Readings are from original sources.

Hist 3282. European Intellectual History: The Late 19th and 20th Centuries. (3 cr)
Second semester of readings in fundamental texts dealing with issues in logic, philosophy, and the methodologies of the historical, social, and natural sciences from the late 19th century to the present. Readings are from original sources.

Hist 3347. Women in Early and Victorian America: 1600-1890. (3 cr)
The varied experiences of American women 1600-1900. Topics include women's involvement in the dispossession of native peoples, westward expansion, slavery, industrialization, reform, revolution, and transformations in family life and sexuality.

Hist 3348. Women in Modern America. (3-4 cr)
History of women in the United States from 1890 to the present. Explores women's changing roles in politics, the labor force, the family, and popular culture.

Hist 3348W. Women in Modern America. (3-4 cr)
History of women in the United States from 1890 to the present. Explores women's changing roles in politics, the labor force, the family, and popular culture.

Hist 3401W. Early Latin America to 1825. (4 cr; A-F only)
Native American and colonial periods to 1825, with emphasis on social, cultural, and economic aspects.

Hist 3402W. Modern Latin America 1825 to Present. (4 cr)
National and contemporary period 1825 to present, with emphasis on social, cultural, political, and economic change.

Hist 3419. The World's Economy Since 1500 in Comparison. (3 cr)
Causes of economic inequities in contemporary world. Long-term economic developments in cases taken from Africa, Asia, Europe, and North/South America. Various theoretical approaches to study of economic development. Introduction to key concepts.

Hist 3421. The World and the West 1400-1900. (3 cr; A-F only. Prereq–One sem of world history or Western civilization recommended)
Survey of the political, economic, religious, and cultural interaction between the peoples of Europe and the peoples of Africa, the Americas, and Asia, with reference to perceptions of alien cultures by both sides.

Hist 3423. Central American Revolutions. (3 cr)
Social, political and economic issues that have shaped Central American history for nearly two centuries. Focuses on influences of colonial histories, capitalist development, ethnic/racial conflict, foreign intervention, Catholic Church, civil war throughout region. Readings cover events in Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama.

Hist 3424. Women and Gender in Latin American History. (3 cr)
Changing gender norms in Latin America over time as compared with lives of women and men of diverse classes and ethnic groups. How women responded to their position in society, on a continuum from accommodation to resistance.

Hist 3425. History of Modern Mexico. (3 cr)
Mexico from independence to the present: struggles for land, liberty, and equality; ethnicity, gender, and class; economic growth, nationalism, and globalization; urbanization, immigration, demographic transition.

Hist 3427. History of Cuba and Puerto Rico. (3 cr)
Historical development of Cuba and Puerto Rico from pre-Columbian times through Spanish conquest to the present. Conquest and colonization, slavery, Hispanic Caribbean society and culture, Operation Bootstrap, Cuban Revolution.

Hist 3428. History of Relations Between United States and Mexico: 1821 to Present. (3 cr)
United States and Mexico relations in the 19th and 20th centuries. Examine histories as they intersect in the late 1820s; loss of Texas; Mexican-American War; economic relations between the two countries including NAFTA and the Chiapas rebellion of 1994.

Hist 3431. History of Africa to 1800. (4 cr)
A survey of African history from earliest times to 1800. Focuses on socioeconomic, political, and cultural development in pre-colonial Africa from ancient Egypt through the era of the trans-Atlantic slave trade.

Hist 3432. History of Africa Since 1800. (4 cr)
Provides a general survey of modern African history from the early 19th century to the present. Focuses on socioeconomic, political, and cultural development in Africa from the abolition of the trans-Atlantic slave trade through the postcolonial era.

Hist 3434. History of South Africa to 1910. (3 cr. §Afro 3204)
Introduction to history of South Africa from early humans to arrival of first Dutch settlers at Cape of Good Hope in 1652 to formation of Union of South Africa in 1910.

Hist 3435. History of South Africa from 1910. (3 cr. §Afro 3205)
History of South Africa from union to present. Focuses on issues such as African/Afrikaner nationalism, structures of apartheid, forced population removals, divestment/sanctions, and post-apartheid era.

Hist 3441. Chicana/o History to 1900. (3 cr)
History of the Mexican people from the 16th through the 19th centuries. Historical theories of colonialism, expansion, economy, assimilation, migration, and settlement; race, class and gender, political, social, and cultural interaction and conflict.

Hist 3442. Chicano History: 1900 to Present. (3 cr)
Migration, repatriation, the Bracero program, contemporary Chicana/o politics, the Chicana/o movement, work, society, and culture. Lecture format with 2-3 videos/movies on selected topics. A wide range of reading from texts and articles.

Hist 3451. Asia in the Ancient World. (3 cr; A-F only)
Comparative approach to the birth of civilization in Asia; rise of ancient wars, imperialism and genocide, ethical protest against violence; rise of the universal empires; culmination, decline, and fall of classical Asian civilizations.

Hist 3461. Introduction to East Asia I: The Imperial Age. (3-4 cr)
Comparative survey of early history of China, Japan, Korea, and Vietnam; early Chinese thought; diffusion of Confucianism, Buddhism, and other values throughout East Asia; political and social history of region to 1600.

Hist 3462. Introduction to East Asia II: 1200-2000. (3-4 cr)
Formation/decline of early modern Asian empires. Western imperialism/Asian nationalism. Social revolution, economic modernization, and cultural change in China, Japan, Korea, and Vietnam, 1200-2000.

Hist 3464. China in the Song, Yuan, and Ming Dynasties. (3 cr. §5464, §EAS 3464)
China during the Song (976-1279), Yuan (1279-1368), and Ming (1368-1644) dynasties; political institutions and social structures. Attention to primary sources and how historians ask and answer questions about the past.

Hist 3465W. China in the Ming and Qing Dynasties. (3 cr. §5465, §EAS 3465)
The political and social history of China from about 1600 until the end of the Qing dynasty in 1911. Topics include ethnicity, daily life, legal structures, city life, and peasantry.

Hist 3467W. State and Revolution in Modern China. (3 cr. §5467, §EAS 3467)
Modern China's political evolution, including the Taiping Rebellion, Republican Revolution, Rise of Nationalist and Communist Parties, Maoist era; reform under Deng Xiaping and the emergence of democracy in Taiwan.

Hist 3468W. Social Change in Modern China. (3 cr. §5468, §EAS 3468)
Opium War and opening of Treaty Ports in 19th century; missionary activity and cultural influence; changes in education system; women's movement; early industrialization; socialism and collectivization after 1949; industrialization of Taiwan; PRC's entry into the world trading system.

Hist 3471. Modern Japan, Meiji to the Present (1868-2000). (3 cr)
Japan's early development as industrial/imperial power after Meiji Restoration of 1868. Political developments in Taisho years: social, cultural, economic trends that supported them. Militarization/mobilization for war in 1930s. Japan's war with China, Pacific War with the United States. American Occupation. Postwar economic recovery, high growth. Changing political/popular culture of 1980s, '90s.

Hist 3472. Early Modern Japan. (3 cr)
Tradition/change in society/culture under Tokugawa shoguns (1600-1867). Growth of cities. Decline of samurai class. Response to Western intrusion.

Hist 3475. Japan and the Second World War. (3 cr)
From origins of war in China through Pearl Harbor decision, conquest of Southeast Asia, defeat in the Pacific, impact of atomic bomb, American occupation, and creation of United States-Japanese alliance.

Hist 3479. Wall and Market: History of Chinese Cities. (3 cr; A-F only)
Introduction to traditional Chinese cities and their modern transformation. Ideal city plan in Confucian classics compared with physical layout of some major cities. Models about Chinese cities, influence of the models on our understanding of Chinese history/society.

Hist 3481. Ancient and Medieval India. (3 cr; A-F only)
The history of India; origins of civilization along the Indus River, Indo-European intrusion, rise of an Indo-Gangetic civilization, response of Buddha to violence, Mauryan empire, classical civilization of India, rise of medieval Hinduism.

Hist 3485. History of Southeast Asia. (3 cr; A-F only)
Origins of civilization, rise of empires such as Angkor, diffusion of Hinduism, Buddhism, Islam, and Christianity, West European intrusion through the imperialist era, rise of nationalism, and the establishment of nation-states.

Hist 3488. Genesis of Modern India. (3 cr; A-F only)
Spans the rise of the Mughal empire in the 1520's to the demise of the British empire in 1947, including present day India, Pakistan, and Bangladesh.

Hist 3489. 20th Century India. (3 cr; A-F only)
India under British hegemony in 1914 through Mahatma Gandhi and his nationalist movement; World War II; the British departure; creation of India and Pakistan; Nehru; Indira and Rajiv Gandhi.

Hist 3491. Islamic Civilization. (3 cr)
Islamic legacy in the classical age (800-1400) in the sciences—natural and medical—mathematics, philosophy, and literature, and their transmission to Europe.

Hist 3493. Islam: Religion and Culture. (3 cr. Prereq–Soph or jr or sr)
Religion of Islam, faith, practices, sectarian splintering. Expansion outside original home to status of world religion. Institutions. Status in Asia, Europe, and Americas.

Hist 3502. Ancient Israel: From Conquest to Exile. (3 cr)
Israelite history in context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focuses on issues raised by archaeological data related to Israelite conquest of Canaan.

Hist 3505. Survey of the Middle East. (3 cr)
Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present.

Hist 3541. Islam in the Catholic Age. (3 cr)
The Rise of Islam in its Arabian setting. Roles of the prophet, the orthodox and Umayyad caliphs. Development of Islamic state and empire, organizations, institutions, and status of Muslims and non-Muslims.

Hist 3542. Medieval Islam. (3 cr)
Islamic dynasties, Umayyads of Spain, Shiites, assassins, Abbasid Caliphate's disintegration and rise of Selguk Turks. Sunnism re-emerges. IlKhanids.

Hist 3543. Arabs Under Mamluks and Ottomans. (3 cr)
Arabs under Mamluk rule. Ottomans conquer Mamluk territory. Ottoman rule. Disintegration and re-emergence under Muhammad Ali of Egypt, dynastic struggles in Syria, rise of Young Turks and Arab revolt.

Hist 3544. Arab World 1920 Until the Present. (3 cr)
Arab world since independence; the struggle for liberation, political stability, development and unification; political structure and conflicts; impact of Arab-Israeli conflict.

Hist 3547. The Ottoman Empire. (3 cr)
Founding of Ottoman society/state to empire, 1300 to end of empire in 1920. Lands, institutions, peoples, legacy. Impact on Europe.

Hist 3608W. History of the Catholic Church in the Middle Ages. (3 cr. Prereq–Intro course in European history before 1500 recommended)
Religious beliefs of Latin Christianity as officially taught and as received by ordinary folk; organization of the church and its implantation in lay society; relations between Latin Christendom and its neighbors, Orthodoxy and Islamdom.

Hist 3609. Military History of Medieval Western Europe. (3 cr)
Concept and conduct of war in Western Europe in the Middle Ages and the relation between the military and society.

Hist 3611. Medieval Cities of Europe: 500-1500. (3 cr)
Evolution of Western European cities from the late Roman town to the early Renaissance city-state.

Hist 3613. History of the Crusades. (3 cr)
Crusading spirit in Europe. Results of classic medieval crusades ca 1095-1285. States established by crusaders in Near East. Internal European crusades. Chronological prolongation of crusading phenomenon.

Hist 3614. Women in Medieval Europe. (3 cr)
Women's role in family, politics, religion, work, and social movements. Representations of women in religious texts, art, literature, scientific studies, and law. Methods/approaches to study of women's history.

Hist 3614W. Women in Medieval Europe. (3 cr)
Women's role in family, politics, religion, work, and social movements. Representations of women in religious texts, art, literature, scientific studies, and law. Methods/approaches to study of women's history.

Hist 3615W. Women in European History: 1500 to the Present. (3 cr)
Women's history and gender relations in modern European history. Methods and primary sources for women's history and the implications of inclusion of women in historical study.

Hist 3616W. France in the Middle Ages. (3 cr)
Politics, society and culture in medieval France from the end of the Carolingians to the end of the Hundred Years War.

Hist 3618. The Dark Ages Illumined: Medieval Europe to 1050. (3 cr)
Origins of medieval Europe, Germanic and Viking invasions, feudalism, manorialism, Islam, the papacy, monarchies, intellectual developments.

Hist 3619. Chivalry, Crisis, and Revival: Medieval History 1050-1500. (3-4 cr)
Chivalry and courtly love, crusades, revival of towns and trade, monarchies, religious developments, Black Death, famine, and wars.

Hist 3621W. Renaissance Italy: 1200-1550. (3 cr. Prereq–Intro course in European history before 1500 recommended)
The political and cultural history of the city-states of northern and central Italy, 1200-1550, with an emphasis on Florence and Venice; readings include Dante and Machiavelli.

Hist 3623W. Germany in the Age of Reformation. (3 cr. Prereq–General course in European history before 1500 recommended)
History of religious reform movements—Lutheran, Calvinist, and Catholic—in the context of German politics, society, and culture; emphasis on primary source readings (written during the period).

Hist 3626. France From the Late 16th Century Through Napoleon: 1594-1815. (3 cr)
The evolution of French government, economy, and society in a broad context: monarchical power and its disintegration; Louis XIV at the apex of the Old Regime; the Enlightenment; the French Revolution; and the rise and fall of Napoleon Bonaparte.

Hist 3632. History of Germany; Reformation to Unification: 1500-1871. (3 cr)
The Reformation era; warfare and demographic catastrophe of the early 1600s; life in town and country; absolutism; Baroque culture; family life and its transformation; economic crisis; Revolution of 1848; the military path to unification.

Hist 3633. Modern Germany: 1870-Present. (3 cr)
Unifying the nation. Industrial development and political instability. Bourgeois culture, growth of socialism. World War I and revolution. Weimar Era, depression, Nazi seizure of power, Hitler's state. World War II and the Holocaust. Cold War and two Germanies. Reunification.

Hist 3634. The Emergence of Ethnic Conflict: Eastern Europe and Byzantium to Circa 1500. (3 cr)
Byzantine and Eastern European history from the 6th century to ca. 1500. Major topics include Byzantium, the medieval Balkans, the rise of the Ottoman empire in Europe, and the West Slavic-Hungarian lands till the Renaissance.

Hist 3636. Conquest, Colonization, and Centralization; The History of European Russia Circa 700 to Circa 1700. (3 cr)
Major topics include the Khazar, Rus', and Bulghar states, Mongol conquest and rule, Muscovite Russia, Ukraine in the 16th-17th centuries, and the Crimean Khanate.

Hist 3637. Modern Russia: From Peter the Great to the Present. (3 cr)
Political, social, and cultural forces which have shaped modern Russia. Emphasis will be on modernization, attempts at reforms in the imperial and Soviet period, and the dissolution of empires.

Hist 3641. Anglo-Saxon England: From King Arthur to William the Conqueror. (3 cr)
History of medieval England from the end of Roman rule to the Norman Conquest. All aspects of society examined to provide a broad picture of the creation of Anglo-Saxon England and the Celtic Frontiers.

Hist 3642. Knights, Peasants, and Bandits in Medieval England. (3-4 cr)
Social history of medieval England from 1066 to 1500. Peasants, nobility, and bourgeoisie, including their economic institutions, living conditions, and entertainments. Legal and illegal ways of coping with economic and social change resulting from plague and wars.

Hist 3651. England Under the Tudors: 1485-1603. (3-4 cr)

Henry VIII and the English Reformation. The early Tudor period, 1485-1547; the reign of Henry VIII and his break with the papacy.

Hist 3652. England Under the Stuarts: 1603-1689. (3 cr)
History of England from the accession of James I (1603) to the Glorious Revolution (1689), including political, social, religious, military, and intellectual history.

Hist 3671. Modern Britain: 1783-1867. (3 cr)
Britain from the end of the American Revolution to the mid-Victorian age; industrialization and reform.

Hist 3672. Modern Britain Since 1867. (3 cr)
Britain from the mid-Victorian age to the near-present; the growth of democracy, the height and depth of world power.

Hist 3681. Irish History. (3 cr)
History of Ireland, primarily modern, with emphasis on politics and Anglo-Irish relations.

Hist 3691W. The British Empire. (3 cr; A-F only)
Gain/loss of colonies in Ireland, America, India, Africa. Development of racism, multicultural composition of British society, debates about economic motives for empire, resistance of colonized peoples to conquest/domination.

Hist 3703W. European Cities: 1300-1800. (3 cr. Prereq–Background in European civilization of late Middle Ages)
The historical experience of selected cities in early modern Europe set within the context of ideas about urban formation and development. Key cities are Venice, Florence, Antwerp, Madrid, Seville, Amsterdam, Paris, and London.

Hist 3704W. Daily Life in Europe: 1300-1800. (3 cr)
Living conditions and daily life in Europe before the Industrial Revolution. Topics include marriage and family, life at court, nobles, peasants, disease, farming, livestock-raising, urban life, the middle classes, manufacturing, trade, piracy, witchcraft, war, crime, and social deviance.

Hist 3705. From Printing Press to Internet: Media, Communications, and History. (3 cr; A-F only)
Print public sphere in 17th, early 18th century. Political conflicts over freedom of press in 18th, 19th century. Emergence of advertising, public relations industries in 20th century. Significance of broadcast, computer network technologies for democratic political systems.

Hist 3707. Social History of Modern Europe. (3 cr)
Transformation from traditional agrarian to modern society, 18th to 20th centuries. Social change; history of the family, marriage and sexuality; the roots of nationalism and racism.

Hist 3709. Science and Enlightenment. (3 cr)
History of scientific revolution and its relationship to Enlightenment, 1650-1800. Copernicus, Galileo, Newton, Voltaire. Science and politics, culture, and religion. Civil society, expertise, objectivity, publicity.

Hist 3712. Economic History of Modern Europe. (3 cr)
Long-term rise/transformation of European economy. Emergence of capitalism and spread of economic growth up to WWI. Political economy of growth, instability, and structural change in 20th century.

Hist 3714W. Medieval Spain. (3 cr)
Development of the medieval kingdoms of Spain from Roman times to ca. 1500. Major social, economic, and cultural developments. Christians, Jewish, and Muslim interaction. Role of Spain in the beginning of European expansion.

Hist 3715. Modern Spain: 1500 to the Present. (3 cr)
Ferdinand and Isabella, the Habsburg and Bourbon dynasties, the 20th-century Civil War and Franco regime, and into the present. Readings, lectures, films, slides, and music will provide a comprehensive view of a vibrant people and their modern history.

Hist 3721. 20th-Century Europe From the Turn of the Century to the End of World War II: 1900-1945. (3 cr. §5721)
The social, political, and cultural changes and conflicts in Europe from the late 19th century to the end of World War II. The background to WWI, its impact, revolution, the failure of interwar stability, fascism, WWII and its consequences.

Hist 3722. 20th-Century Europe From the End of World War II to the End of the Cold War: 1945-1991. (3 cr)
The social, economic, political, and cultural impacts of WWII upon Europe; the division of Europe, communist regimes in Eastern Europe, cooperation in Western Europe, impacts of modernization and the end of the Cold War in 1991.

Hist 3727W. History of the Holocaust. (3 cr)
Study of 1933-1945 extermination of six million Jews and others by Nazi Germany on basis of race. European anti-Semitism. Implications of social Darwinism and race theory. Perpetrators, victims, onlookers, resistance. Theological responses of Jews and Christians.

Hist 3729. Nazi Germany and Hitler's Europe. (3 cr; A-F only)
Comprehensive exploration of Third Reich. Students will examine How the Nazis came to power, transformations of 1930s, imposition of racial politics against Jews/others, nature of total war. Students read historical accounts, memoirs, state documents, view films.

Hist 3731W. Citizens and the State in Modern France From the Revolution of 1789 to Post-de Gaulle: 1789-1991. (3 cr)
A history of the citizen and the state in France from the French Revolution to the present.

Hist 3735. Politics of Ideas: European Thought in 20th Century Contexts. (3 cr; A-F only)
Development of political ideas/ideologies in 20th century. How to understand ideas in various contexts of their production, dissemination, and appropriation. Students read primarily original political/social philosophical texts that have shaped social, cultural, and political landscape.

Hist 3747W. Habsburg Central Europe: 1740-1918. (3 cr)
Evolution of Habsburg rule in Central Europe from reforms of Maria Theresa to imperial collapse in 1918. Economic/social transformation. Revolutions of 1848. Political modernization. Rise of nationalism/anti-Semitism. Fin-de-siecle culture. WWI.

Hist 3748. Austria in the 20th Century. (3 cr)
Austria from Paris Peace Treaties to present. Political instability, social conflict, and economic stagnation between the World Wars. Nazi rule and WWII. Economic miracle, consensus politics, and neutrality after 1945. Austria after Cold War.

Hist 3767. Eastern Orthodoxy: History and Culture. (3 cr)
Development of the orthodox church in Byzantium, the Islamic Near East, the Slavic world and in the diaspora; impact of orthodoxy on political and cultural institutions, interaction with other Christian and non-Christian communities; orthodox spirituality and aesthetics.

Hist 3775. History of the European Jews from the Middle Ages to the Present. (3 cr)
Social, economic, and cultural history of the Jewish people in Europe and their interaction with other peoples; history and causes of anti-Semitism; Zionism and assimilation; Chasidism and socialism.

Hist 3797. History of Population. (3 cr)
History of births, deaths, migration, population size, and population characteristics. Evidence from Europe, the United States, and Latin America with comparative material from Africa and Asia. Methods of historical population analysis and research of historical population data.

Hist 3800. Topics in Early American History. (3 cr [max 15 cr])
For advanced undergraduate majors and non-majors. Focus on intensive exploration of particular topics in early American history such as economic history, demographic regimes, social history, intellectual history, regions, slavery, religion, and witchcraft in colonial America.

Hist 3801. The People of Early America: 16th to 18th Centuries. (3 cr)
Multicultural approach to early American history focusing on the interactions of Africans, Europeans, and American Indians who came together to create a new world in North America during the 16th, 17th, and 18th centuries.

Hist 3809. The Peoples of Revolutionary America. (3 cr)
Culture/structure of late colonial politics. Regionalism. Connections between society and politics. Imperial crisis and independence. Military history of the Revolution. Origins of national politics and the constitution.

Hist 3812. The Civil War and Reconstruction. (3 cr)
United States from 1848 to 1877. Causes of sectional crisis; Southern secession; Lincoln and emancipation; military history; impact of war North and South; Reconstruction efforts to change the Southern life and transform the status of African Americans.

Hist 3821. United States in the 20th Century to 1945. (3 cr)
American politics and society in the progressive era, the 1920's, the Great Depression and World War II. Economic reform at home, the challenges of world war abroad, and social change affecting the status of women and racial minorities.

Hist 3822. United States in the 20th Century Since 1945. (3 cr)
American politics and society in the postwar era, the diplomacy of the Cold War, the civil rights movement, the Vietnam War, cultural clashes in the 1960's, Watergate, the conservative resurgence and the end of the Cold War.

Hist 3834. Law in American Life, Colonial Era to Civil War. (3 cr; A-F only)
Understandings of law/property held by colonists, Indians. Conceptions of relationships among family, community, state held in colonial America; conceptions held today. Law of slavery in colonial era. American Revolution/Constitution. Law, industrialization. Legal legitimacy, federalism, Civil War as constitutional crisis.

Hist 3835. Law in American Life: 1865 to Present. (3 cr)
Centralization of state power, rise of individual rights. Constitutionalization of American law. Passage, promise, abrogation, rediscovery of 13th, 14th, 15th Amendments. Expansion of federal administrative state. Origins of civil liberties. Law and the welfare state. Civil Rights Revolution of 1950s, '60s, '70s. Product liability law. Second half of two-semester survey. May be taken independently.

Hist 3837. Minnesota History. (3 cr)
Topics in political/social history of Minnesota and its region in nineteenth/twentieth centuries.

Hist 3841. American Business History. (3 cr)
Development of the modern corporation and its managerial structure. Contributions of Eli Whitney, Edison, Ford, Carnegie, Rockefeller, J.P. Morgan, Alfred Sloan, others. History of relation of business to economic development, social change, and government policies.

Hist 3842. History of Silicon Valley. (3 cr; A-F only)
Critical, historical examination of birth/development of "Silicon Valley," the high-tech region around San Jose, California. Myths/ideologies that define Silicon Valley in popular imagination. Deeper history of region. Comparisons with Twin Cities as framework for analysis.

Hist 3844. American Economic History to 1870. (3 cr)

Economic development, regional specialization and early industrialization. Slavery and southern development. The role of railroads and government policies. Economic impact of the Civil War.

Hist 3845. American Economic History: 1870 to the Present. (3 cr)
Farm problems in the 19th century. Rise of big business and finance capitalism. The 1920s economy and the Great Depression. Corporate capitalism, government policies and the modern economy.

Hist 3851. Labor in the 19th-Century United States. (3 cr)
The development of U.S. labor in and after the Age of Industry. Industrial unionism and radicalism's challenge to the AFL; organized labor's uneasy integration into American society. Management theories and workers actions. Race, gender, and the changing working class.

Hist 3852. U.S. Labor in the 20th Century. (3 cr)
The development of a working class from the preindustrial to an industrial age. Responses of American workers through labor organization, slave resistance, and political reform. The Knights of Labor, the formation of the AFL, and the challenges of Marxism.

Hist 3861. European American; From Immigrants to Ethnics: 1790-1890. (3 cr; A-F only)
Conditions which contributed to the mass exodus from northern/western Europe during this century as well as the attraction of the United States. Major theme will be how immigrants shaped and in turn were shaped by America.

Hist 3862. European Americans: 1890-1990. (3 cr; A-F only)
From the 1890s, immigrants came predominantly from southern/eastern Europe. A central theme is the role of immigrants in the transformation of America from a rural agricultural to an urban industrial society.

Hist 3864. African American History: Slavery to Reconstruction. (3 cr)
Importance of dynamics of class, gender, region, and political ideology. Changing nature of race/racism.

Hist 3865. African American History: 1890 to Present. (4 cr; A-F only)
Integral migrations, industrialization, unionization, Great Depression, world wars, large-scale movements for social/political change.

Hist 3870. Topics in American Indian History. (3 cr)
Designed for advanced undergraduates. Topics may include social history, oral history, history of particular regions, political systems, education, and policy.

Hist 3871. American Indian History: Pre-Contact to 1830. (4 cr)
Introduction to American Indian history from ancient native America to the removal era. Focuses on the social, cultural, political, and economic diversity of Native American peoples and Native American experiences with European colonialism.

Hist 3872. American Indian History: 1830 to the Present. (4 cr)
Focus on the impact of federal Indian policy on American Indian cultures and societies, and on American Indian culture change.

Hist 3875W. Comparative Race and Ethnicity in U.S. History. (3-4 cr; A-F only. Prereq–# or Δ)
Examines America through its cultural diversity. Changing notions of "American" national identity/citizenship from nineteenth century to present. Historical experiences of Native Americans, African Americans, Hispanic Americans, European immigrants, and Asian Americans: How these groups were defined in relation to each other and in relation to the nation.

Hist 3877. Asian American History, 1850-Present. (3 cr)
Asian American history and contemporary issues, from 1850 to the present. Immigration, labor, anti-Asian movements, women/families, impact of World War Two, new immigrant/refugee communities, civil rights, Asian American identity/culture.

Hist 3878. American West, 1848-Present. (3 cr)
American West from Mexican-American War to present. U.S. expansion, Native-Anglo conflict, migration/immigration. Race, ethnicity, labor, class, and gender in the West. Business/politics of "settling" the region.

Hist 3881. History of American Foreign Relations to 1914. (3 cr)
American involvement in world affairs from 1760-1914 including political, economic, social and, cultural relations by individuals, groups, governmental, and non-governmental agencies focusing on nation building, creation of continental and commercial empires, hemispheric hegemony, cultural expansion, and wartime diplomacy.

Hist 3882. History of American Foreign Relations: 1914 to Present. (3 cr)
American involvement in world affairs 1914 to present. Political, economic, social, and cultural activities by individuals, groups, and governmental and non-governmental agencies, participation in international organizations, commercial and cultural imperialism, and war and Cold War diplomacy.

Hist 3891. American Military History. (4 cr)
Interaction of geography, politics, society, and technology in military growth. Influence of military on American national development 17th-20th centuries. Expansion/effect of land, sea, and air forces in 20th century.

Hist 3900. Topics in Medieval and Modern European History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or #)
Selected topics in medieval and modern European history not covered in regular courses. To be taught as staffing and demand exist.

Hist 3910. Topics in U.S. History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or #)
Selected topics in U.S. history not covered in regular courses. To be taught as staffing and demand exist.

Hist 3920. Topics in African History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or #)
Selected topics in African History not covered in regular courses. To be taught as staffing and demand exist.

Hist 3930. Topics in Ancient History. (3 cr [max 12 cr])
Selected topics in Near Eastern, Egyptian, Greek, and Roman History.

Hist 3940. Topics in Asian History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or #)
Selected topics in Asian history not covered in regular courses. To be taught as staffing and demand exist.

Hist 3950. Topics in Latin American History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or #)
Selected topics in Latin American history not covered in regular courses. To be taught as staffing and demand exist.

Hist 3951H. Junior Honors Seminar. (4 cr. Prereq–History honors candidate)
Intended for History honors majors in their junior year, the course is run as a seminar, with emphasis on readings and discussion. Weekly sessions focus on selected topics relating to historical method and historiography.

Hist 3960. Topics in History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or #)
Selected topics in history not covered in regular courses and covering more than one geographic area/time period. To be taught as staffing and demand exist.

Hist 3970. Supplemental Discussion in History. (1 cr [max 3 cr]. Prereq–Concurrent registration)
Extra discussion section with T.A. Attached to concurrent 3xxx course.

Hist 3980W. Supplemental Writing in History. (1 cr [max 4 cr]; A-F only. Prereq–#; must be attached to a 3-credit 3xxx or 5xxx course taken simultaneously)
May be attached, by agreement of instructor and students, to any 3xxx or 5xxx course to make a writing-intensive experience.

Hist 3990. Historical Internship. (1-4 cr)
Internships with a historical society, government or community historical organization. Arranged through and supervised by the department.

Hist 3993. Directed Study. (1-16 cr [max 16 cr]; A-F only. Prereq–#, Δ, ❑)
Guided individual reading or study. Open to qualified students for one or more semesters.

Hist 3994. Directed Research. (1-16 cr [max 16 cr]; A-F only. Prereq–#, Δ, ❑)
Qualified students work on a tutorial basis.

Hist 4051. Ancient Near East and Egypt: Neolithic to 1500 BCE. (3 cr; A-F only. §ANE 4051. Prereq–Prev coursework in ancient history recommended)
Lands of Western Asia and Northeast Africa from Neolithic through Middle Bronze Age. Interdependent technological/political developments, such as agriculture, state formation, and writing. Use of literature/art as vehicles for articulating concepts. Changing relationships among culture/polities of ancient Near East and regions beyond.

Hist 4052. Ancient Near East and Egypt: 1500 to 323 BCE. (3 cr; A-F only. §ANE 4052. Prereq–4051 or prev coursework in ancient history recommended)
Lands of Western Asia and Northeast Africa from Late Bronze Age to death of Alexander in 323 BCE. Growth/decline of empires. Diplomatic relations and sociopolitic transformations among Late Bronze and Iron Age states. New military technologies. Developments in religion/theology.

Hist 4061. History of the Greek World from Earliest Times to 400 B.C. (3 cr)
Trace the history of the Greeks from their initial appearance in Greece in the Bronze Age to the close of the 5th century B.C. Special attention will be devoted to the polis, military development, and intellectual change.

Hist 4062. History of the Greek World: 400 to 30 B.C. (3 cr)
Trace the history of the Greeks from the end of the Peloponnesian War through the decline of the polis, the rise of Macedon and Alexander the Great, the fragmentation of Alexander's empire in the Hellenistic World and the eventual Roman take over of that world.

Hist 4071. History of Rome to 78 B.C. (3 cr. Prereq–An appropriate introductory course is recommended)
Intensively examine the political, institutional, and socioeconomic history of Rome from its origins to the death of Sulla in 78 B.C. The institutional strengths and weaknesses that led to the rise and fall of the Republic are the primary theme.

Hist 4072. History of Rome: 78 B.C. to A.D. 117. (3 cr. Prereq–An appropriate introductory course is recommended)
Intensively examine the political, institutional, and socioeconomic history of Rome from the death of Sulla in 78 B.C. to the death of Trajan in A.D. 117.

Hist 4073. History of Rome: A.D. 117 to 641. (3 cr. Prereq–An appropriate introductory course is recommended)
Intensively examine the political, institutional, and socioeconomic history of Rome from the death of Trajan in A.D. 117 to the death of Theodosius in A.D. 395. Explores one historical question—the decline and fall of the Roman Empire.

Hist 4135. Vikings, East Slavs, Turks, and Finns: European Russia in the Early Middle Ages. (4 cr; A-F only)
An analysis of the Turkic nomads, East Slavic agriculturalists, and Finnic foragers who inhabited early medieval European Russia and the Khazar, Bulghar, and Rus'/Viking states which came to rule them.

Hist 4136. Reformer, Paranoid, or Divine-Right Monarch: Ivan the Terrible and His Bloody Reign, 1533-1584. (4 cr; A-F only)
Does Tsar Ivan IV (1530-1584) deserve his epithet of Terrible? Examine the various interpretations of Ivan

and critically examine the primary sources for his reign. Attempt to determine Ivan's guilt in a simulated trial.

Hist 4271. The Viking World: Story, History, and Archaeology. (3 cr)
Viking society and expansion of Viking influence abroad. Viking impact on Western Europe; interactions with Slavic lands; settlement of North Atlantic islands; and Western Europe's impact on Scandinavian lands. Analyzes archaeological, historical, linguistic, and numismatic evidence.

Hist 4272. Medieval Scandinavia: Ideas, Resources, Institutions, and Their History. (3 cr)
Examination of the economic, mental, political, and social landscapes and structures of Scandinavia in the 12th through 15th centuries, as well as of the principal events.

Hist 4273. Early Modern Scandinavia: State Formation, International Politics, and Social Change. (3 cr)
Economic, mental, political, and social landscapes and structures of Scandinavia in the 16th through 18th centuries. Constitutional and institutional developments in the process of state formation. Competition between Denmark and Sweden for hegemony in Scandinavia and the Baltic.

Hist 4274. Modern Scandinavia: The 19th and 20th Centuries. (3 cr)
Economic, political, and social landscapes and structures of Scandinavia in the 19th and 20th centuries with emphasis on migration, industrialization, democratization, domestic politics, international relations, the Scandinavian welfare state, and European integration.

Hist 4337. Bill of Rights and the Supreme Court Since 1865. (4 cr. Prereq–Jr or sr or grad student)
Constitutional, political, philosophical, social context of leading U.S. Supreme Court cases on Bill of Rights. Emphasizes property rights, free speech, freedom of religion, right to bear arms, criminal defendants' rights, death penalty.

Hist 4431. Seminar: History of Women in South Africa. (3 cr. §Afro 4001)
Changing role/status of women in South Africa from pre-colonial era to present. Relationships to political, social, economic development.

Hist 4521. Proseminar: Nationalism in Japan. (3 cr)

Hist 4522. Proseminar: Racism, Atrocities, Justice in the Pacific War. (3 cr)
Controversies over evidence and interpretation regarding Japanese aggression and war guilt in the Pacific War, including such issues as the responsibility of the Emperor and the American use of atomic weapons.

Hist 4900. Topics in Medieval and Modern European History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or grad or #)
Selected topics in medieval and modern European history not covered in regular courses. Taught as staffing permits.

Hist 4910. Topics in U.S. History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or grad or #)
Selected topics in U.S. history not covered in regular courses. Taught as staffing permits.

Hist 4920. Topics in African History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or grad or #)
Selected topics in African history not covered in regular courses. Taught as staffing permits.

Hist 4930. Topics in Ancient History. (1-4 cr [max 16 cr]; A-F only. Prereq–Advanced undergrad or grad)
Selected topics in Ancient history not covered in regular courses. Taught as staffing permits.

Hist 4940. Topics in Asian History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or grad or #)
Selected topics in Asian history not covered in regular courses. Taught as staffing permits.

Hist 4950. Topics in Latin American History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or grad or #)
Selected topics in Latin American history not covered in regular courses. Taught as staffing permits.

Hist 4960. Topics in History. (1-4 cr [max 16 cr]. Prereq–Jr or sr or grad or #)
Selected topics in history not covered in regular courses. Taught as staffing permits.

Hist 4961W. Major Paper. (4 cr; A-F only. Prereq–Δ)
Required of History majors, usually taken in senior year. Research papers on topics students choose; work largely with primary sources. Faculty guidance in sections limited to 15 students. Sign up in Undergraduate Studies Office two semesters in advance.

Hist 4970. Historical Internship. (1-12 cr [max 12 cr]; S-N only)
Internship with a historical society, government or community historical organization. Arranged through and supervised by the department.

Hist 5011. Quantitative Methods for Historical Research. (4 cr. Prereq–#)
Basics of quantitative historical data collection, measurement, and analysis.

Hist 5035. The Germ Theory and Modern Medicine. (3 cr. Prereq–History of medicine or of science course recommended for undergrads)
A study of the development of the modern germ theory of disease and of its applications in medicine and public health. Emphasis will be placed on developments between 1860 and 1950

Hist 5045. The Modern Medical Profession. (3 cr. Prereq–History of medicine or of science course recommended for undergrads)
A comparative history of the medical professions in the United States and in select northern European nations. Analyze the process of professionalization and the role the profession has played in western industrial societies since 1800.

Hist 5051. Before Herodotus: History and Historiography of Mesopotamia and the Ancient Near East. (3 cr; A-F only. Prereq–Prev coursework in ancient Near Eastern history recommended)
Historical method/sources for ancient Near Eastern history. Historical traditions. Historiographic texts of Mesopotamia and neighboring regions of the ancient Near East, secondary emphasis on their relationship to works of classical historians such as Herodotus. Use of these sources in modern historiography of ancient Near East.

Hist 5111. Proseminar in the History of Medieval Europe. (3 cr; A-F only. Prereq–Advanced undergrads of exceptional ability or grads, #)
Examination of basic scholarly bibliography for medieval Western European history. Aim is to help students to prepare for M.A. and Ph.D. examinations.

Hist 5115. Medieval Latin Historians. (3 cr. Prereq–Reading knowledge of Latin)
Writing of history in Western Europe during the Middle Ages. Focus on idea of history, philosophy of various historians, techniques of research by medieval historians and chroniclers, history as literature, and value of medieval histories to modern research scholars. Latin texts only.

Hist 5251. Socialist/Post-socialist Transformations. (3 cr; A-F only)
Transformations underway in post-socialist societies of Eastern Europe, former Soviet Union. Ramifications of abandonment of state socialism, introduction of market relations. Effect of former system, new market system on cultural institutions/identities.

Hist 5264. Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries. (3 cr)
Interaction with Europe and Asia; attempts at modernization and reform; emancipation of the serfs and rise of revolutionary movements.

Hist 5265. 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime. (3 cr)
Analysis of the factors that led to the collapse of the tsarist regime; discussion of the 1917 revolution, the evolution of the Soviet regime and the collapse of Soviet communism. Emphasis on the role of nationalities and the rise of the Commonwealth of independent states.

Hist 5274. Southeastern Europe: Ottoman Empire and Successor States. (3 cr)
The legacy of empires; 18th-century background; rise of Balkan nationalism; the Eastern Questions in the 18th and 19th centuries; the Balkans in the 20th century; population movements or exchanges; ethnic conflict in the Communist and Post-Communist periods.

Hist 5276. Intellectual and Cultural History of Modern Greece. (3 cr)
Literary and cultural contributions of modern Greece. The modern Greek experience seen through Greek historical and cultural monuments. An attempt at self-definition.

Hist 5285. Problems in Historiography and Representation of the Holocaust. (3 cr. Prereq–JwSt 3521 or RelS 3521 or #)
Issues connected with the Holocaust. Inclusiveness of other groups, Holocaust vs. "Shoah," historiographical conflicts about perpetrators, problems of representation in literature/art, problems of narrative theology after Auschwitz.

Hist 5294. Social History of Russia and Eastern Europe Through the 19th Century. (3 cr)
Lives of peasants and workers, nobles and merchants. Topics include family, marriage, sexuality; culture and tradition; transformation from an agricultural to a modern society.

Hist 5295. Social History of Russia and Eastern Europe From the Late 19th Century to the Present. (3 cr)
Social movements (revolutionary, nationalist, women's); communist and post-communist societies.

Hist 5301. U.S. Women's Legal History. (3 cr)
Women's legal status in U.S. history, 1648 to present. Changes in women's legal status in marriage, divorce, and child custody; reproductive/sexual autonomy; and economic/educational equality. Differences among women based on race, class, and ethnicity.

Hist 5379. Problems in Early American History. (3 cr)
Intensive consideration of topics in early American history. Topics may include readings in race, class, and gender; comparative colonialism; slavery; demography; economic history; religion; and regions in the colonial world.

Hist 5381. Minnesota History Workshop. (3-4 cr [max 4 cr]. Prereq–1301, 1302)
A case study and seminar approach to historical research and interpretation. It offers teachers and other scholars a chance to survey a particular topic in Minnesota history and to write their own historical narrative based on primary source research.

Hist 5421. Gender in Latin American History. (3 cr)
Women's history/masculinity. Gender/colonialism, marriage, sexuality, nationalism, labor, political movements, feminism.

Hist 5436. Social History of African Women: 1850 to the Present. (3 cr. Prereq–# for undergrads)
Explore the historical forces which have shaped African women's everyday lives and the ways in which these women have been active agents in the making of their own histories.

Hist 5438. Seminar: The African American Experience in South Africa. (3 cr. §Afro 5191)
Ideological, political, religious, and cultural ties that have informed African American and black South African relations from late 18th century to present.

Hist 5446. Problems in West African History. (3 cr. Prereq–# for undergrads)
This problem-centered course explores several of the major historiographical, methodological, and theoretical debates in West African history. Core topics include state formation, trade, slavery, Islam, gender, and colonialism.

Hist 5464. China in the Song, Yuan, and Ming

Dynasties. (3 cr. §3464, §EAS 3464)
China during the Song (976-1279), Yuan (1279-1368) and Ming (1368-1644) dynasties, political institutions, and social structures. Attention to primary sources and how historians ask and answer questions about the past.

Hist 5465. China in the Ming and Qing Dynasties. (3 cr. §3465, §EAS 3465. Prereq–#)
Political/social history of China from 1600 until end of Qing dynasty in 1911. Ethnicity, daily life, legal structures, city life, peasantry.

Hist 5467. State and Revolution in Modern China. (3 cr. §3467, §EAS 3467)
Modern China's political evolution including the Taiping Rebellion, Republican Revolution, rise of Nationalist and Communist parties, Maoist era; reform under Deng Xiaoping, and the emergence of democracy in Taiwan.

Hist 5468. Social Change in Modern China. (3 cr. §3468)
Opium War and opening of Treaty Ports in 19th century; missionary activity and cultural influence; changes in education system; women's movement; early industrialization; socialism and collectivization after 1949; industrialization of Taiwan; PRC's entry into the world trading system.

Hist 5472. Early Modern Japan. (3 cr)
Tradition/change in society/culture under Tokugawa shoguns (1600-1867). Growth of cities. Decline of samurai class. Response to Western intrusion.

Hist 5473. Japan's Modernities: Historiographies. (3 cr; A-F only. Prereq–[Advanced undergrad, #] or grad student)
Historiography on modern Japan in English language scholarship. Major trends since 1950s, latest scholarship. Issues concerning Japan's modernity. Definitions of modernity, modernization, and modernism. Relationship between knowledge-making and nation building. Japan's place in world.

Hist 5474. Sex and the Politics of Desire: Japan and Beyond. (3 cr; A-F only. Prereq–Grad student or #)
History of gender/sexuality in modern Japan and Korea. Geography of Japan. Theoretical/methodological literature not specific to Japan. Sexology, eugenics, feminism, nationalism, colonialism, cyber sexuality.

Hist 5479. Wall and Market: History of Chinese Cities. (3 cr; A-F only. §Hist 3479)
Introduction to traditional Chinese cities and their modern transformation. Ideal city plan in Confucian classics compared with physical layout of some major cities. Models about Chinese cities, influence of the models on our understanding of Chinese history/society.

Hist 5501. Medieval Europe and the World. (3 cr; A-F only)
An examination of the place of medieval Europe in the world. The relations of Europe with Asia, Africa, and the Americas. European knowledge of the world's other great cultures. European travelers and explorers. Assessment of other cultures' knowledge of Europe in the period.

Hist 5505. Survey of the Middle East. (3 cr. Prereq–Grad or #)
Peoples, lands, cultures of the Middle East, from earliest civilizations to present.

Hist 5520. Topics in Chinese History. (3 cr [max 12 cr])
Selected topics not covered in regular courses. Taught as staffing permits.

Hist 5541. Islam in the Catholic Age. (3 cr. Prereq–Grad or #)
Rise of Islam in its Arabian setting. Roles of prophet, orthodox/Umayyad caliphs. Development of Islamic state/empire, organizations, institutions, status of Muslims/non-Muslims.

Hist 5547. The Ottoman Empire. (3 cr. Prereq–Grad student or #)
Founding of Ottoman society/state to empire, 1300 to end of empire in 1920. Lands, institutions, peoples, legacy. Impact on Europe.

Hist 5611. Proseminar in Medieval History. (3 cr; A-F only. Prereq–Grad student or #)
Examines basic scholarly bibliography for medieval Western Europe history during Middle Ages. Foundation for students to teach courses in medieval history, prepare for general doctoral exam.

Hist 5612. Proseminar in Medieval History. (3 cr; A-F only. Prereq–[5611, grad student] or #)
Examines basic scholarly bibliography for medieval Western Europe History during Middle Ages. Foundation for students to teach courses in medieval history, prepare for general doctoral exam.

Hist 5614. The Medieval Church. (3 cr. Prereq–Grad student or #)
Introduction to history of western church in Middle Ages. Emphasizes church teachings and institutional structures, beliefs/practices of lay people, medieval Christian encounter with non-Christian world.

Hist 5616. Proseminar in Medieval Spain. (3 cr; A-F only. Prereq–#)
Graduate research on the development of the medieval kingdoms of Spain from Roman times to ca. 1500. Emphasis on major social, economic, and cultural developments. Christian, Jewish, and Muslim interaction. Spain and the beginnings of European expansion.

Hist 5617. Spain in the Early Modern Period: 1492-1814. (3 cr)
Historiography, documents, and archives of early modern Spain analyzed. Includes reading in modern English and Spanish and practical experience with Spanish manuscript documents from the period.

Hist 5621. Proseminar: The French Revolution. (3 cr; A-F only. Prereq–Grad student or [advanced undergrad, #])
Historical literature about French Revolution of 1789. Old Regime political culture, Enlightenment, origins of the revolution, revolutionary transformations in society, politics/culture both in France and abroad, the Terror, Napoleon, revolutionary legacy.

Hist 5631. Proseminar: Comparative Early Modern History. (3 cr; A-F only. Prereq–Hist grad or #)
Critical reading of historical literature dealing with integration of the globe during the early modern period, ca. 1350-1750; book reports, class discussion.

Hist 5632. World History Proseminar. (3 cr; A-F only. Prereq–#)
Theoretical approaches to world/global history. Review of major theories, controversies, chronologies, pedagogical approaches.

Hist 5634. Proseminar in Medieval and Early Modern European Russia. (3 cr; A-F only. Prereq–Some coursework in history of medieval and early modern European Russia or #)
Selected readings covering the major studies, key primary sources, and basic interpretations of the peoples of medieval and early modern European Russia as well as an analysis of the new approaches and interpretations in the field.

Hist 5649. Ideas in Context: Making Early Modern Knowledge, 1500-1800. (3 cr; A-F only. Prereq–Grad student or #)
Role of institutions/locale in development of early-modern European thought/culture. University, academy, learned society, princely court, museum, printing house, workshop, trading company, armies/navies, state bureaucracies, salons, other independent associations of nascent civil society.

Hist 5650. Proseminar: Early Modern Europe. (3 cr; A-F only. Prereq–Hist grad or #)
Critical reading of historical literature for early modern Europe, ca. 1450-1700., dealing with France, Germany, Italy, the Low Countries, and Spain. Each student chooses a country to focus on; book reports, class discussion.

Hist 5651. Proseminar in Tudor England: 1485-1603. (3 cr; A-F only. Prereq–#)
A critical study of principal writings about English history during the Tudor and Stuart periods.

Hist 5652. Proseminar in Stuart England: 1603-1689. (3 cr; A-F only. Prereq–#)
Critical study of principal writings about English history.

Hist 5671. Proseminar: Modern Britain. (3 cr; A-F only. Prereq–#)
Critical study of major writings in British history, 1760-1945, and preparation for research in field.

Hist 5715. Readings in European Women's History: 1450-1750. (3 cr; A-F only)
Introduction to current historical research on European women's history, 1450-1750. Topics include gender roles and form of family structure, women's participation in religious movements, legal status of women.

Hist 5720. Society and Politics in Modern Europe. (3 cr [max 6 cr]; A-F only. Prereq–Grad or #)
Introduction to literature in English on problems of modern European social, cultural, political history. Thematic/geographic focus varies year to year. Topics include historical approaches to class/gender relations, state formation as social/political process, family history, evolution of public life, popular culture.

Hist 5721. Contemporary Europe From the Late 19th Century to the Beginning of the Cold War: 1890-1950. (3 cr. §3721. Prereq–Previous coursework in 19th- and/or 20th-century Europe, #)
The historical literature and debates surrounding major issues in the social, political, cultural, and economic development of Europe from the turn of the century through the impact of WWII. Topics include the development of imperialism, national rivalries, social and political conflict, the rise of fascism and communism, and the origins of war.

Hist 5735. European Women's History; 1750 to the Present. (3-4 cr. Prereq–#)
Selected themes in modern European women's history. Forms of patriarchy. Women in the Enlightenment. Women and revolution. Gender, class, and family life. Women in the labor force. Sexuality and reproduction. Female education. Women's political movements. Women and imperialism. Gender and fascism.

Hist 5740. Topics in Modern German History. (3-4 cr [max 12 cr]; A-F only. Prereq–#)
Readings and discussions on some central questions concerning the history of Germany during the modern period with a particular emphasis on the relationship between social change and political development. Offerings vary in thematic and chronological focus.

Hist 5756. Modern Greece; Mid-18th Century to Present: Greek Nationalism and Establishment of the Greek State. (3 cr)
Evolution of modern Greece from mid-18th century to the present. Political, cultural, and socioeconomic factors that contributed to Greek nationalism. Establishment of independent Greece and its role in the European community of nations.

Hist 5761. Proseminar—Imperial Russia. (3 cr. Prereq–Knowledge of Russian or German or French)
Western and Russian historiography on crucial issues of imperial Russia. Political institutions; culture and society; modernization and reforms; new interpretations.

Hist 5762. Proseminar in 20th Century Russia. (3 cr. Prereq–5761, knowledge of Russian or German or French)
Western and Russian historiography on crucial issues of 20th-century Russia. The nature of revolutions, debate over the evolution of the Soviet regime, the collapse of empires, new interpretations.

Hist 5777. Proseminar in Habsburg Central Europe. (3 cr. Prereq–#)
Central Europe under Habsburg rule from the

reforms of Maria Theresa to imperial collapse. Continuity and change in society; economic and political modernization; the rise of national consciousness and anti-Semitism; politics and culture in the Fin de Siecle; the Empire and World War I.

Hist 5794. Proseminar in European Economic History. (3 cr. Prereq–#)
Europe's rise in the world economy; England's industrial revolution and uneven development in Europe; imperialism and World War I; the Great Depression; the post-1945 economic miracle; continuity and change in Eastern Europe.

Hist 5797. Methods of Population History. (3 cr)
Standard methods of population analysis with a special focus on methods widely used for historical population research.

Hist 5801. Seminar in Early American History. (3 cr; A-F only)
Introduction to the literature of early American history. Readings selected from some of the best scholarship in the field, the questions that now hold the attention of colonial historians, and the theories, methods, and sources they use in pursuit of those questions.

Hist 5821. American History in the Twentieth Century. (3 cr; A-F only. Prereq–Grad student, #)
Intensive readings seminar.

Hist 5841. Proseminar in American Economic History. (3 cr; A-F only. Prereq–#)
Historical literature on American economic and business history from American Revolution to the modern economy.

Hist 5844. U.S. Labor History. (3 cr)
Readings in classic and recent approaches to the history of the working class in the United States. Central topics include slavery and free labor, women's paid and unpaid labor, management strategy, labor protest, and trade union organization.

Hist 5857. Proseminar: Readings in the History of American Women. (3 cr. Prereq–#)
An intensive graduate-level readings course. Survey selected significant topics in historical literature, conceptual frameworks, and methodological problems in the history of American women from 1600 to the present.

Hist 5861. History of American Immigration. (3 cr; A-F only. Prereq–#)
Readings in historical literature on immigration to the United States. Emphasis on recent works distinguished by new research methodologies and interpretations.

Hist 5862. History of American Immigration. (3 cr; A-F only. Prereq–#)
Readings in historical literature on immigration to the United States. Emphasis on recent works distinguished by new research methodologies and interpretations. Each student undertakes an independent reading and/or research project.

Hist 5864. Proseminar: African-American History. (3 cr. Prereq–#)
Readings in African-American history designed for both incoming and advanced graduate students. Structured around various themes and issues including slavery, Reconstruction, the Great Depression, and the civil rights movement.

Hist 5865. Proseminar: African-American History. (3 cr. Prereq–#)
The second half of the graduate sequence in African-American history is oriented primarily toward thinking about and performing independent research.

Hist 5871. Readings in U.S. Intellectual History: 19th-20th Centuries. (3 cr. Prereq–#)
Definitions of American national identity from 1789 to the present as expressed in politics, religion, literature, painting, music, architecture, and history.

Hist 5881. American Foreign Relations to 1895. (3 cr. Prereq–#)
Intensive readings in the historiography of American foreign relations with emphasis on American imperialism, domestic courses of foreign policy, and international political, economic, and cultural relations.

Hist 5882. American Foreign Relations Since 1895. (4 cr. Prereq–#)
Intensive readings in the historiography of American foreign relations with emphasis on American imperialism, domestic courses of foreign policy, and international political, economic, and cultural relations.

Hist 5890. Problems in American Indian History. (3 cr. Prereq–#)
Intensive consideration of topics in American Indian history. Topics may include social history, history of particular regions, political systems, education, and American Indian policy.

Hist 5900. Topics in European/Medieval History. (1-4 cr [max 16 cr]. Prereq–Grad or [advanced undergrad student with #])
Selected topics in European or medieval history not covered in regular courses; taught as staffing permits.

Hist 5901. Latin America Proseminar: Colonial. (3 cr. Prereq–#)
Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes.

Hist 5902. Latin America Proseminar: Modern. (3 cr. Prereq–#)
Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes.

Hist 5910. Topics in U.S. History. (1-4 cr [max 16 cr]. Prereq–Grad or advanced undergrad student with #)
Selected topics in U.S. history not covered in regular courses. Taught as staffing permits.

Hist 5920. Topics in African Social History. (3 cr [max 16 cr]. Prereq–Grad or #)
Focuses on the experiences of Africans in their workplaces, households and communities. Detailed treatment of selected historical themes. Topics vary by semester.

Hist 5930. Topics in Ancient History. (1-4 cr [max 16 cr]; A-F only. Prereq–Grad or #)
Selected topics in ancient history not covered in regular courses. To be taught as staffing permits and as enrollment warrants.

Hist 5931. Topics in Comparative Third World History. (3 cr [max 16 cr]; A-F only. Prereq–Grad student or #)
Topics specified in *Class Schedule.*

Hist 5932. African Historiography and Methodology. (3 cr; A-F only)
Recent analysis of several major themes in the historiography of pre-colonial and colonial Africa and the methods used by African historians to reconstruct the African past.

Hist 5933. Seminar in Ancient History. (3 cr; A-F only. Prereq–Previous coursework in Greek or Roman history, #)
Seminar on a selected topic in ancient history.

Hist 5934. Comparative History and Social Theory. (3 cr; A-F only. Prereq–[Grad or upper-div undergrad] student, #)
Focuses on works of history/sociology that are broadly comparative/theoretical and speak to issues of state formation, social movements, social structure, and economic development.

Hist 5940. Topics in Modern Chinese History. (1-4 cr [max 16 cr]; A-F only. Prereq–#)
Possible topics include cultural, economic, intellectual, political, and social history.

Hist 5941. Readings in Chinese Documents. (3 cr. Prereq–Reading knowledge of Chinese)
Readings in Chinese on a topic to be selected by the instructor. Depending on the topic and the time period, readings may involve a mixture of modern and classical Chinese or may be entirely in modern Chinese. Consult instructor for more information.

Hist 5942. Topics in the History of Medicine. (3 cr. Prereq–Prior history of medicine or history of science course recommended for undergrads)
An exploration of topics central to the history of medicine. Emphasis on mid-18th century to the present. Topics vary yearly.

Hist 5950. Topics in Latin American History. (1-4 cr [max 16 cr]; A-F only. Prereq–Grad or advanced undergrad with #)
Selected topics in Latin American history not covered in regular courses. Taught as staffing permits.

Hist 5960. Topics in History. (1-4 cr [max 16 cr]. Prereq–Grad or [advanced undergrad with #])
Selected topics in history not covered in regular courses. Taught as staffing permits.

Hist 5962. Expansion of Europe. (3 cr; A-F only. Prereq–Grad student, #)
Research proseminar on actions of Europeans in wider world, 1350-1790. Based on documents in James Ford Bell Library.

Hist 5964. Comparative Economic History. (3 cr. Prereq–#)
Theoretical approaches guide cross-cultural examinations of major issues in the economic history of East Asia, Europe, and the New World. Agrarian structures in economic development, markets, the state and economic development, and the industrial revolution.

Hist 5970. Advanced Research in Quantitative History. (4 cr [max 16 cr])
Students will carry out publishable-quality research on a quantitative historical topic.

Hist 5971. Proseminar: Editing and Publishing. (3 cr; A-F only)
Evolution of modern scholarly publication as system of knowledge. Survey of history of printing/manufacture of books. Recent changes in information technology. Contemporary academic publishing. Basics of editing/editorial policy. Journals/presses.

Hist 5980. Topics in Comparative Women's History. (3 cr [max 16 cr])
Cross-cultural/thematic explorations in history of women. Topics vary. May include gender and colonialism; women and class formation; women and religion; sexuality; medical construction of gender; women's narratives as historical sources; gender and politics.

Hist 5993. Directed Study. (1-16 cr [max 16 cr]; A-F only. Prereq–#, Δ, ❑)
Qualified senior and graduate students may register for work on tutorial basis. Guided individual reading or study.

Hist 5994. Directed Research. (1-16 cr [max 16 cr]; A-F only. Prereq–#, Δ, ❑)
Qualified senior and graduate students may register for work on a tutorial basis.

History of Medicine (HMed)

College of Liberal Arts

HMed 3001W. Health Care in History I. (3 cr)
Introduction to intellectual/social history of European/American medicine, health care from classical antiquity through 18th century.

HMed 3002W. Health Care in History II. (3 cr)
Introduction to intellectual/social history of European/American medicine, health care in 19th/20th centuries.

HMed 3055. Women, Health, and History. (3 cr)
Women's historical roles as healers, patients, research subjects, health activists. Biological determinism, reproduction, mental health, nursing,

women physicians, public health reformers, alternative practitioners. Gender disparities in diagnosis, treatment, research, careers. Assignments allow students to explore individual interests.

HMed 5002. Public Health Issues in Historical Perspective. (3 cr)
Introduction to the evolution of major recurring problems and issues in public health including environment and health, food customs and nutrition, control of alcohol and drugs, venereal diseases and public policy, human resources regulation, and relationship of science to promotion of health.

HMed 5035. The Germ Theory and Modern Medicine. (3 cr)
Analysis of the formulation of the germ theory of disease and of its consequences for medical procedures (therapeutics, surgery, management of hospitals), public health programs, and the structure and prestige of the medical profession.

HMed 5045. Modern Medical Profession. (3 cr)
Historical analysis of American medical profession in 19th/20th centuries. Role of institutions, influence of social/moral values. Consequences of specialization, scientific innovation.

HMed 5055. Women, Health, and History. (3 cr. Prereq–Grad student or [jr or sr] with prev coursework in hist or #)
Women's historical roles as healers, patients, research subjects, health activists. Biological determinism, reproduction, mental health, nursing, women physicians, public health reformers, alternative practitioners. Gender disparities in diagnosis, treatment, research, careers. Assignments allow students to explore individual interests.

HMed 5200. Early History of Medicine to 1700. (3 cr; A-F only)
An introductory survey of the history of medicine in Europe and America.

HMed 5201. History of Medicine from 1700 to 1900. (3 cr. Prereq–HMed 5-200)
An introductory survey of the history of medicine in Europe and America.

HMed 5210. Seminar: Theories and Methods in Medical History. (3 cr; A-F only)
Historiography of the history of medicine.

HMed 5211. Seminar: Theories and Methods in Medical History. (3 cr; A-F only. Prereq–5210)
Use of archives, primary sources. Supervised research project.

HMed 5940. Topics in the History of Medicine. (3 cr)
Seminar on the historical relations between medicine and the State from the 18th to 20th centuries.

History of Science and Technology (HSci)

College of Liberal Arts

HSci 1714. Technology and Western Civilization: To the Industrial Revolution. (4 cr. §3714)
History of technology in its cultural context from earliest times to the Industrial Revolution. Neolithic Revolution, Bronze and Iron Ages, ancient civilizations, Greece, Rome, Middle Ages, and Renaissance.

HSci 1715. Technology and Western Civilization: Since the Industrial Revolution. (4 cr. §3715)
Relations of technology to culture since Industrial Revolution. Diffusion of Industrial Revolution, modes of adaptation by different cultures, and social impact.

HSci 1814. Introduction to History of Science: Ancient Science to the Scientific Revolution. (4 cr. §3814)
Development and changing nature of the sciences are placed in their cultural context. Babylonian and Greek science; decline and transmission of Greek science; Scientific Revolution (1500-1700) from Copernicus to Newton.

HSci 1815. Introduction to History of Science: Modern Science. (4 cr. §3815)
Development and changing nature of the sciences are placed in their cultural context. Newton and new mechanics; new chemistry; light; Darwin and species; new experimental biology; atomic and nuclear physics; relationships among science, technology, society, and politics.

HSci 1905. Freshman Seminar. (2 cr; A-F only. Prereq–Fr with no more than 24 cr)
Topics vary. See *Class Schedule*.

HSci 3211. Biology and Culture in the 19th and 20th Centuries. (3 cr. §5211)
Changing conceptions of life and aims and methods of biology; changing relationships between biology and the physical and social sciences; broader intellectual and cultural dimensions of developments in biology.

HSci 3242. The Darwinian Revolution. (3 cr. §5242)
Development of evolutionary thought in 19th/20th centuries. Emphasizes Darwin's theory of evolution by natural selection. Scientific, economic, political, religious, philosophical dimensions of Darwinism. Comparative reception of Darwinism in different countries/cultures.

HSci 3244. History of Ecology and Environmentalism. (3 cr. §5244)
Development of ecological thought from 18th century natural theology to contemporary ecology and conservation biology; changing views of the "balance" and the "economy" of nature; conceptual and methodological developments in ecosystems ecology; connections between ecology and conservation, and between population and environmental politics.

HSci 3331. Technology and American Culture. (3 cr. §5331)
Development of American technology in its cultural and intellectual context from 1790 to present. Technology of Native Americans; transfer of technology to America; establishment of an infrastructure promoting economic growth; and social response to technological developments.

HSci 3332. Science and American Culture. (3 cr. §5332)
Development of American science, including transfer of science to America; development of indigenous traditions for pursuit of science; establishment of infrastructure for education and research; response of public to scientific development.

HSci 3333V. Honors Course: Issues in Twentieth Century American Science. (3 cr)
Historical approach to understanding science and technology, emphasizing intellectual, political, and social contexts; decision-making by practitioners on issues of importance to the profession and the community; and topics relating to popular science, science, and warfare.

HSci 3401. Ethics in Science and Technology. (3 cr. §5401)
Historical issues involving research ethics (e.g., human experiments and environmental, nuclear, and safety issues).

HSci 3714. Technology and Western Civilization: To the Industrial Revolution. (4 cr. §1714)
History of technology in its cultural context from earliest times to the Industrial Revolution. Neolithic Revolution, Bronze and Iron Ages, ancient civilizations, Greece, Rome, Middle Ages, and Renaissance.

HSci 3715. Technology and Western Civilization: Since the Industrial Revolution. (4 cr. §1715)
Relations of technology to culture since Industrial Revolution. Diffusion of Industrial Revolution, modes of adaptation by different cultures, and social impact.

HSci 3814. Introduction to History of Science: Ancient Science to the Scientific Revolution. (4 cr. §1814)
Development and changing nature of the sciences are placed in their cultural context. Babylonian and Greek science; decline and transmission of Greek science; Scientific Revolution (1500-1700) from Copernicus to Newton.

HSci 3815. Introduction to History of Science: Modern Science. (4 cr. §1815)
Development and changing nature of the sciences are placed in their cultural context. Newton and new mechanics; new chemistry; light; Darwin and species; new experimental biology; atomic and nuclear physics; relationships among science, technology, society, and politics.

HSci 4050. Special Topics in History of Science. (3 cr)
Topics specified in *Class Schedule*.

HSci 4060. Special Topics in History of Technology. (3 cr)
Topics specified in *Class Schedule*

HSci 4111. History of 19th-Century Physics. (3 cr. §Phys 4111. Prereq–General physics or #)
Legacy of 17th-century experimental and theoretical physics. Experimental and theoretical discoveries in 19th-century physics (light, atomic theory, heat, thermodynamics and statistical mechanics, electromagnetism) within the context of educational, institutional, and political developments in Europe and the United States.

HSci 4121. History of 20th-Century Physics. (3 cr. §Phys 4121. Prereq–General physics or #)
Experimental and theoretical discoveries in 20th-century physics (modern physics, theory of relativity, quantum theories, nuclear physics to World War II) within the context of educational, institutional, and political developments in Europe and the United States.

HSci 4125. The Nuclear Age. (3 cr)
History of the nuclear age embraces X-rays, radiation, the atom and its nucleus, subatomic particles, nuclear weapons and power, growth of nuclear science in university and national laboratories, effects of cold war, legacies of Hiroshima, Eniwetak, and Chernobyl.

HSci 4302. History of High-Technology Weapons. (3 cr)
History of high-technology weapons, including ancient missile launchers, gunpowder, cannons, and their role in the expansion of the West. Influence of arms-making on the American system of manufactures, naval warfare, air power, nuclear weapons, and intercontinental ballistic missile.

HSci 4321. History of Computing. (3 cr. §CSci 4921)
Developments in the last 150 years; evolution of hardware and software; growth of computer and semiconductor industries and their relation to other business areas; changing relationships resulting from new data-gathering and analysis techniques; automation; social and ethical issues.

HSci 4411. Art and Science in Early Modern Europe. (3 cr)
Interaction of art and science from the Renaissance to the 19th century. Development of linear perspective, color theory and artistic practice, and scientific illustration and representation.

HSci 4455. Women, Gender, and Science. (3 cr)
Three intersecting themes analyzed from 1700s to the present: women in science, sexual and gendered concepts in modern sciences, and impact of science on conceptions of sexuality and gender in society.

HSci 5211. Biology and Culture in the 19th and 20th Centuries. (3 cr. §3211)
Changing conceptions of life and aims and methods of biology; changing relationships between biology and the physical and social sciences; broader intellectual and cultural dimensions of developments in biology.

HSci 5242. The Darwinian Revolution. (3 cr. §3242)
Development of evolutionary thought in 19th/20th centuries. Emphasizes Darwin's theory of evolution by natural selection. Scientific, economic, political, religious, philosophical dimensions of Darwinism.

Comparative reception of Darwinism in different countries/cultures.

HSci 5244. History of Ecology and Environmentalism. (3 cr. §3244)
Development of ecological thought from 18th century natural theology to contemporary ecology and conservation biology; changing views of "balance" and the "economy" of nature; conceptual and methodological developments in ecosystems ecology; connections between ecology and conservation, population and environmental politics.

HSci 5331. Technology and American Culture. (3 cr. §3331)
Development of American technology in its cultural and intellectual context from 1790 to present. Technology of Native Americans; transfer of technology to America; establishment of an infrastructure promoting economic growth; and social response to technological developments.

HSci 5332. Science and American Culture. (3 cr. §3332)
Development of American science, including transfer of science to America; development of indigenous traditions for pursuit of science; establishment of infrastructure for education and research; response of public to scientific development.

HSci 5401. Ethics in Science and Technology. (3 cr. §3401)
Historical issues involving research ethics (e.g., human experiments and environmental, nuclear, and safety issues).

HSci 5993. Directed Studies. (1-15 cr [max 15 cr]. Prereq–#)
Guided individual reading or study.

HSci 5994. Directed Research. (1-15 cr [max 15 cr]. Prereq–#)

Hmong (Hmng)

Department of Asian Languages and Literatures

College of Liberal Arts

Hmng 1015. Accelerated Beginning Hmong. (5 cr. Prereq–Ability in basic spoken Hmong)
Review of grammar/usage, practice in reading/writing. Introduction to Hmong literature and formal writing. Topics in Hmong culture.

Hmng 1016. Accelerated Intermediate Hmong. (5 cr. Prereq–1015, ability in basic spoken Hmong)
Review of grammar/usage, continued practice in reading/writing. Expanded introduction to Hmong literature and formal writing. Selected topics in Hmong culture.

Honors Colloquia (HCol)

CLA Honors Program

College of Liberal Arts

HCol 1001H. Honors Colloquium: Introduction to the Arts and Sciences. (1 cr; S-N only. Prereq–1st term fr, honors)
Introduction to problems these disciplines address, methods they use. Discussions led by faculty representing various disciplines.

HCol 1010H, 1020H, 1030H, 1040H, 1050H, 1060, 1070, 1080, 1090, 1110V, 1120, 1130, 1140. Honors Colloquium. (1-3 cr [max 12 cr]. Prereq–[Fr or soph], honors)
Special topics. Discussions, active learning. Often interdisciplinary.

HCol 1093. Directed Studies. (1-4 cr [max 16 cr]. Prereq–[Fr or soph], honors, #, Δ, ❑)
For additional research related to a colloquium topic.

Honors Seminar (HSem)

CLA Honors Program

College of Liberal Arts

HSem 3010H, 3020H, 3030H, 3040H, 3050H, 3060H, 3070H, 3080H, 3110V, 3120V, 3130V, 3140V. Honors Seminar. (1-4 cr [max 12 cr]. Prereq–[Jr or sr], honors)
Special topics. Discussions, active learning. Often interdisciplinary.

HSem 3093H. Directed Studies. (1-4 cr [max 16 cr]. Prereq–[Jr or sr], honors, #, Δ, ❑)
Additional research related to seminar topic.

Horticultural Science (Hort)

Department of Horticultural Science

College of Agricultural, Food and Environmental Sciences

Hort 1001. Plant Propagation. (4 cr)
Principles and techniques of propagating plants by seeds, cuttings, grafts, buds, layers, and division. Lectures on principles; labs on practice of various propagating techniques.

Hort 1002. Home Horticulture. (3 cr. Prereq–Non-horticulture majors)
Fundamental concepts of plant identification, growth, and culture with practical applications to home landscape, floral design, house plants, fruit, flower, and vegetable gardening.

Hort 1003. Master Gardener Core Course: Horticulture for Home and Garden. (3 cr)
Foundation in soils; botany; entomology; plant pathology; indoor, herbaceous, and wood plants; lawn fruits/vegetables; pesticides; wildlife. Emphasizes extension publications/resources useful in answering consumer horticulture questions.

Hort 1011. Herbaceous Landscape Plants. (4 cr)
Taxonomy, identification, ecology, and landscape uses of annuals, perennials, wildflowers, ferns, tender/hardy bulbs, and tropicals/sub-tropicals used in interior landscapes.

Hort 1012. Woody Landscape Plants. (4 cr)
Taxonomy, identification, ecology, and landscape uses of trees, shrubs, vines, groundcovers, and evergreens. Lecture and lab.

Hort 1013. Floral Design. (2 cr)
Design for use in commercial flower shops and at home. Principles/elements of design. Wedding arrangements. Corsages. Decorative use of dried materials.

Hort 3002. Greenhouse Management. (3 cr; A-F only. Prereq–1001)
Worldwide floricultural production; selection of greenhouse site, construction, heating, and cooling. Greenhouse cost accounting and analysis. Root media, sanitation, water, fertilization, chemical growth regulation, temperature, light, and marketing. Lab in greenhouse operations plus field trips.

Hort 3005. Environmental Effects on Horticultural Crops. (2 cr; A-F only. Prereq–[1001, ¶Biol 3002, ¶Biol 3005, [Chem 1021 or equiv]] or #)
Effects of environment on plant growth/physiology. How horticulturalists manipulate environment to produce high quality plants.

Hort 3018. Landscape Operations. (2 cr. Prereq–1001 or #)
Demonstration/hands-on experience with landscape operations. Planting, mulching, staking, pruning, fertilizing, large tree care, seeding, sodding, aerifying, calibrating, irrigating, surveying. Discussion/laboratory. Team taught by faculty, staff, and industry professionals.

Hort 3090. Horticultural Practicum. (2-4 cr [max 12 cr]. Prereq–Jr or sr Hort major, #)
Approved field, laboratory, or greenhouse experiences in application of horticultural information and practices.

Hort 4021. Landscape Design, Implementation, and Management I. (4 cr. Prereq–1001, 1011, 1012)
Based on philosophy of sustainable landscape theory and practice. Emphasis on sustainability to all phases of landscape development. Lab includes design, implementation, and management of actual landscape.

Hort 4041. Nursery Production and Management I. (4 cr; A-F only. Prereq–[1001, 1012] or #)
Production, maintenance, and marketing of woody ornamental plants. Establishment/management of nursery or garden centers. Lab, field trips.

Hort 4041W. Nursery Production and Management I. (4 cr; A-F only. Prereq–[1001, 1012] or #)
Production, maintenance, and marketing of woody ornamental plants. Establishment/management of nursery or garden centers. Lab, field trips.

Hort 4051. Potted Plant Production. (4 cr. Prereq–1001, 1011, 3002, #)
Problem-solving and management practices for propagation, production, and use of floral crops. Emphasizes potted plants, hydroponics. Growing, marketing, and using floral crops to modify the environment. Lecture, lab, field trips.

Hort 4061. Turf and Landscape Management. (3 cr. Prereq–1001, Soil 2125)
Biology of turfgrasses and ecology of landscape systems. Turfgrass installation, management, and culture of turfgrass communities and landscape plant systems. Sod production, industrial grounds, general lawn care, park and recreation areas, and athletic field management. Business management and decision making programs considered. Problem solving and case studies.

Hort 4071. Applications of Biotechnology to Plant Improvement. (4 cr. Prereq–Chem 1011 or 1021, GCB 3022 or equiv)
Fundamentals of plant molecular biology and biotechnology with emphasis on their applications to plant propagation and crop improvement. Lab includes plant tissue culture, gel electrophoresis, and other techniques of plant molecular biology.

Hort 4072. Growing Plants Organically: What It Means To Be Green. (3 cr. Prereq–1001 or Biol 2022 or PBio 3xxx or equiv, jr or sr or #)
Science and ethics of organic cultivation. What is meant by "green" from a legal, scientific, and ethical perspective? Explore original literature on an organic practice, prepare a written report, and lead a class discussion.

Hort 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; S-N only. Prereq–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering)
Professional experience in horticulture firms or government agencies attained through supervised practical experience; evaluate reports, consultations with faculty advisers and employers.

Hort 4401. Plant Genetics and Breeding. (4 cr. §Agro 4401. Prereq–[Biol 1009 or equiv or grad], #)
Principles of plant genetics and environmental variation. Applications of genetics to crop evolution and breeding of self-pollinated, cross-pollinated, and asexually propagated crops. Lab experiments investigate hybridization, variation, and selection.

Hort 5007. Advanced Plant Propagation. (3 cr. Prereq–1001)
Control of growth/development in sexual/asexual reproduction of plants. Effects of environment, plant growth substances. Protocols on dormancy, origin, and development of adventitious structures. Specialized propagation techniques. Lecture, lab.

Hort 5018. Landscape Operations. (3 cr. Prereq–1001 or #)
Demonstration/hands-on experiences with landscape operations. Planting, mulching, staking, pruning, fertilizing, large tree care, seeding, sodding, aerifying, calibrating, irrigating, surveying. Written

report on special project or experiment. Discussion/laboratory. Team taught by faculty, staff, and industry professionals.

Hort 5022. Topics in Plant Science for Teachers. (1-4 cr. Prereq–Biol 2012 or equiv or ed course; no cr for Hort major or grad student)

Hort 5023. Public Garden Management. (2 cr. Prereq–#)
Overview of knowledge/skills necessary to manage a public garden. History of public gardens. Development of mission and vision. Planning and design. Operations. Education and research. Fund raising, business management, personnel, marketing, conservation.

Hort 5024. Landscape Development. (1 cr; A-F only. Prereq–5021 or #)
Hands-on experience in landscape development. Plan takeoffs, site evaluation/preparation, planting, installation/construction, equipment operation, hard-good/plant handling.

Hort 5031. Sustainable Fruit Production Systems. (2 cr; A-F only. Prereq–1001, 3005)
Principles of fruit production. Emphasizes temperature fruit crops. Integrated management of fruit cropping systems, including site selection, cultural management practices, taxonomic classification, physiological/environmental control of plant development. Integration of writing into understanding various fruit cropping systems.

Hort 5032. Sustainable Commercial Vegetable Production Systems. (3 cr; A-F only. Prereq–[3005, Ent 3005, PlPa 2001, Soils 2125] or #)
Principles of commercial vegetable production. Integrated management of vegetable cropping systems. Site selection/environment, seed/stand establishment, cultural management practices, commodity use, handling from harvest to market. Perspectives on types of vegetable cultivars. Origin, historical significance/improvement through breeding, nutrition/medicinal aspects, physiological/environmental control of development.

Hort 5041. Nursery Production and Management II. (3 cr; A-F only. Prereq–4041)
In-depth look at nursery practices, including innovative production systems. Specific crop schedules, using technical and economic data for production. Pest management and regulations for the nursery industry.

Hort 5051. Bedding Plant and Specialty Annual/Perennial Crop Production. (4 cr; A-F only. Prereq–1001, 1011, 3002)
Propagation, production, and use of floral crops. Emphasizes bedding plants, perennials, and cut flowers. Growing, marketing, and using herbaceous plants. Cultural practices. Manipulation of environment for growth/quality. Lab, field trips.

Hort 5052. Cut Flower Production. (3 cr; A-F only. Prereq–1001, 1011, 3002)
Media management, insect/disease control, management of annual versus perennial plant production systems. Soil modification, seed germination, transplanting, scheduling, weed control, fertilization/irrigation. Environment management, hydroponic solution management, pest management in closed environment. Post-harvest management/care, drying/dying procedures. Consumer surveys at Minneapolis and St. Paul farmers' markets.

Hort 5061. Turfgrass Science. (3 cr. Prereq–4061)
For advanced students in turf with career objectives in professional turf management. Emphasis on ecology, physiology, and theory of turf population dynamics and specialized management situations such as golf course, commercial sod production, and fine turf athletic settings.

Hort 5071. Restoration and Reclamation Ecology. (3 cr. Prereq–Biol 2022 or Biol 3002, Biol 1001 or Biol 3407 or equiv or #)
Ecological and physiological concepts as a basis for revegetation of grasslands, wetlands, forests, and other landscapes. Plant selection, stand establishment, evaluating revegetation success. State and federal programs that administer restoration and reclamation programs. Field trips within Minnesota.

Hort 5090. Directed Studies. (1-6 cr [max 18 cr]. Prereq–8 cr upper div Hort courses, #)
In-depth exploration of concepts, technology, materials, or programs in specific area to expand professional competency and self-confidence. Planning, organizing, implementing, and evaluating knowledge obtained from formal education and from experience.

Human Ecology (HE)

College of Human Ecology

HE 1200V. First-Year Honors Colloquium. (1-2 cr [max 4 cr]; A-F only. Prereq–CHE honors)
Diverse ways of knowing about world, fields of study organized to understand human environment, their place within academic/career pathways that cross within intellectual traditions/professional fields.

HE 1902. Freshman Seminar: Cultural Diversity. (1-3 cr [max 6 cr]; A-F only. Prereq–Fr)
Issues related to human ecology disciplines and cultural diversity. Topics announced in advance. Small-group seminar.

HE 1903. Freshman Seminar. (1-3 cr [max 6 cr]; A-F only. Prereq–Fr)
Development of two-/three-dimensional models that explore concepts of ethics/citizenship. Emphasizes visualization as tool for understanding/communicating complex relationships.

HE 1904. Freshman Seminar. (1-3 cr [max 6 cr]; A-F only. Prereq–Fr)
Issues related to human ecology disciplines and international perspectives. At least 1/3 of course material on societies outside the United States. Topics announced in advance. Small-group seminar.

HE 1910W. Freshman Seminar. (1-3 cr [max 6 cr]; A-F only. Prereq–Fr)
Issues related to human ecology disciplines. Topics announced in advance. Small-group seminar.

HE 3201. Strategic Career Planning. (1 cr; A-F only. Prereq–Jr or sr or at least 60 cr)
Students research career opportunities related to retail industry, set career objectives based on an assessment of individual skills/interests, and identify job search skills to implement a transition from college to employment.

HE 4140. Special Topics in Human Ecology. (1-4 cr [max 12 cr]. Prereq–#)
In-depth study of a selected topic.

HE 4150H. Honors Seminar. (1-3 cr [max 6 cr]. Prereq–Honors; CHE students must take A-F)
Topics specified in *Class Schedule.*

HE 4160H. Honors Capstone Project. (2 cr [max 4 cr]; A-F only. Prereq–CHE honors, #; A-F only)
Individualizes the honors experience by connecting aspects of major program with special academic interests.

Human Resource Development (HRD)

Department of Work, Community, and Family Education

College of Education and Human Development

HRD 3601. Student and Trainee Assessment. (2 cr; A-F only)
Development of tests of knowledge, affect, and processes for programs focused on instruction of skills associated with business/industry. Development of learning progress reporting systems. Evaluation of instructional effectiveness. Application of tests and other evaluation instruments to assess/report learning in business/industry and career/technical education fields.

HRD 3629. Course Development for Business and Industry. (2 cr; A-F only)
Designing instructional programs/courses that help learners develop desired competence. Designing instruction for performance based training and vocational/technical education. Developing course syllabus components that clarify course expectations. Developing academic/community-based elements that complement course goals.

HRD 3661. Instructional Methods for Business and Industry. (2 cr; A-F only)
Theory/practice in instructional methods/techniques for career and technical education (CTE) instructors and for human resources and development (HRD) professionals. Focus on how to deliver instruction using various teaching methodologies, select appropriate methodologies, and plan for their delivery.

HRD 5001. Survey: Human Resource Development and Adult Education. (3 cr)
Overview of fields of human resource development and adult education. Includes societal context, theories, processes, definitions, philosophies, goals, sponsoring agencies, professional roles, participants, and resources. Focus on the unique characteristics and ways the fields overlap and enhance one another.

HRD 5101. Foundations of Human Resource Development. (1 cr)
Introduction to human resource development as a field of study and practice.

HRD 5102. Economic Foundation of Human Resource Development. (1 cr. Prereq–5101)
Introduction to economics as a core discipline supporting the theory and practice of human resource development.

HRD 5103. Psychological Foundation of Human Resource Development. (1 cr. Prereq–5101)
Introduction to psychology as a core discipline supporting the theory and practice of human resource development.

HRD 5104. Systems Foundation of Human Resource Development. (1 cr. Prereq–5101)
Introduction to system theory as a core discipline supporting the theory and practice of human resource development.

HRD 5105. Strategic Planning through Human Resources. (3 cr; A-F only. Prereq–5001 or 5101, 5102, 5103, 5104)
The theory and practice of strategically developing, utilizing, and aligning human resources as a major contributor to organizational and quality improvement success.

HRD 5106. Evaluation in Human Resource Development. (3 cr; A-F only)
Evaluation of human resource development efforts from the perspective of impact on organizations, work processes, and individuals, plus follow-up decisions.

HRD 5111. Facilitation and Meeting Skills. (1 cr)
Introduction to the disciplines of planning and running effective meetings. Tools and methods for meeting management and evaluation are presented within the context of organization development.

HRD 5196. Internship: Human Resource Development. (1-10 cr [max 10 cr]; S-N only. Prereq–5001, 5201 or 5301)
Students apply and contract for human resource development positions. Contracts describe specific HRD responsibilities to be fulfilled during internship and theory-to-practice learning outcomes.

HRD 5201. Personnel Training and Development. (3 cr; A-F only)
Introduction to the personnel training and

development process in organizations and the advancement of expertise in the areas of analysis, design, development, implementation, and evaluation.

HRD 5202. Training on the Internet. (3 cr)
Major concepts, skills, and techniques for giving and receiving training on the Internet.

HRD 5301. Organization Development. (3 cr; A-F only)
Introduction to major concepts, skills, and techniques for organization development and change.

HRD 5302. Managing Work Teams in Business and Industry. (3 cr; A-F only. Prereq–2 core courses in HRD)
Frameworks and strategies for developing effective work teams. Skill development in facilitating resolution of conflicts in organizations. Provides foundational information as well as practical applications for participants (upper-level and graduate students) to become small team leaders.

HRD 5408. International Human Resource Development. (3 cr)
Problems, practices, programs, theories, and methodologies in human resource development as practiced internationally.

HRD 5409. Planning and Decision-Making Skills. (1 cr)
Introduction to the disciplines of planning and decision making typically used in process improvement interventions. Tools and methods for facilitating group decisions and problem solving.

HRD 5496. International Field Study in Human Resource Development. (3 cr. Prereq–5001)
Field study of the organization development, personnel training and development, career development, and quality improvement theories and practices in a selected nation.

HRD 5601. Student and Trainee Assessment: Advanced. (2 cr; A-F only)
Developing learning progress reporting systems and tests of knowledge, affect, and processes for programs focused on instruction of skills associated with business/industry. Evaluating instructional effectiveness. Applying tests and other evaluation instruments to assess/report learning in business/industry and career/technical education fields. Students develop each type of test and an overall evaluation plan for a course.

HRD 5611. Futurism in Human Resource Development and Adult Education. (3 cr)
Exploration of the implications of future developments in several arenas on theory and practice in human resource development and adult education.

HRD 5612. Managing and Consulting in Human Resource Development and Adult Education. (3 cr. Prereq–5001)
The theory of managing and consulting in human resource development and adult education. Includes a personal assessment of role requirements and experimentation with management and consultation processes and techniques.

HRD 5624. Sales Training. (3 cr; A-F only)
Strategies and techniques for developing effective sales people.

HRD 5625. Technical Skills Training. (3 cr)
Analyzing technical skills training practices in business and industry. Systems and process analysis and trouble-shooting of work behavior; design methods and developing training materials.

HRD 5626. Customer Service Training. (3 cr; A-F only)
Overview of customer service strategies used by successful organizations and training practices used to develop customer-oriented personnel.

HRD 5627. Management and Supervisory Training and Development. (3 cr)
Problems, practices, programs, and methodologies relating to the training and development of managers and supervisors, including needed competencies, needs assessment, delivery modes, and evaluation.

HRD 5628. Multimedia Presentations in Business. (3 cr. Prereq–BIE 5011 or equiv)
Designing, creating, and presenting information using multimedia resources in business settings.

HRD 5629. Course Development in Business and Industry: Advanced. (2 cr; A-F only)
Designing instructional programs/courses that help learners develop desired competence. Designing instruction for performance based training and vocational/technical education. Developing course syllabus components that clarify course expectations. Developing academic/community-based elements that complement course goals. Reflect on and compare performance-based instruction with other curriculum models for the field.

HRD 5661. Instructional Methods in Business and Industry Education: Advanced. (2 cr)
Theory/practice in instructional methods for career/technical education (CTE) instructors and human resources/development (HRD) professionals. How to select various teaching methods and plan for their delivery. Preparing an instructional methods plan to clarify course content, teaching methods selected, rationale for their selection, and how a student organization might facilitate student learning.

HRD 5662. Computer Training in School and Industry Settings. (2 cr. Prereq–BIE 5011 or equiv)
Alternative practices for teaching business applications software use—such as word processors, spreadsheets, graphics software, desktop publishing software, databases, and communications software—in both public school and industry settings.

HRD 5770. Special Topics in Human Resource Development. (1-4 cr [max 12 cr])
Explanation of issues, methods, and knowledge in HRD areas. Topics vary.

HRD 5802. Education and Human Resource Development Through Tourism. (3 cr; A-F only)
Policies/practices of education and human resource development in tourism industry.

HRD 5821. Diversity Issues and Practices in Work, Community, and Family Settings. (3 cr)
Nature of diverse populations and their unique learning and training needs, exemplary programs, and collaborative efforts among persons representing work, community, and family settings.

HRD 5822. Diversity and Organizational Transformation in Education, Work, and Community. (2 cr)
Develop models for understanding the impact of diversity on individual, organizational, and community outcomes. Discuss organizational change in relation to diversity.

Human Resources and Industrial Relations (HRIR)

Industrial Relations Center

Curtis L. Carlson School of Management

HRIR 3021. Human Resource Management and Industrial Relations. (3 cr. Prereq–1102, Econ 1101, Psy 1001, 50 cr)
Role of human resource management in organizations. Labor markets, recruitment, selection, training, compensation, labor relations, and performance management. Evolution of work. Discrimination in employment. Work performance and its reward. Effects of changing technology.

HRIR 3024. Governing the Workplace: Comparative Perspectives. (2 cr)
An international comparison of who is allowed to make the rules governing the employment relationship. Study of alternative models/systems (e.g., business, government, employees, unions, market forces, mixed models) in the context of the U.S. and other countries. Exploration of models for the future.

HRIR 3031. Staffing and Selection: Strategic and Operational Concerns. (2 cr. Prereq–[[At least 50 sem cr or 75 qtr cr], 2.00 GPA] or Δ)
Introduction to theory/practice of staffing decisions: recruitment, selection, promotion, demotion, transfer, dismissal, layoff, retirement. Staffing analyzed from strategic/operational perspectives. Legal issues.

HRIR 3032. Training and Development. (2 cr. Prereq–[[At least 50 sem cr or 75 qtr cr], 2.00 GPA] or Δ)
Introduction to theory/research/practice of design/implementation/evaluation of employee training/development programs. Training as process for influencing individual/organizational outcomes (e.g., performance, job satisfaction, work climate).

HRIR 3041. The Individual in the Organization. (2 cr)
Focus on factors influencing individual work performance. Includes motivation, perceptual differences, career choice, psychological contracts, assumptions about workers/work, leadership/management, learning/skill development, openness to change. Examines evidence on current trends.

HRIR 3042. The Individual and Organizational Performance. (2 cr)
Factors influencing group, team, and organizational performance. Examines systems that drive organizational success. Topics include job design and organization structure, organization effectiveness measures, culture, group dynamics, teamwork; power and influence.

HRIR 3051. Compensation: Theory and Practice. (2 cr. Prereq–[[At least 50 sem cr or 75 qtr cr], 2.00 GPA] or Δ)
Introduction to compensation/reward programs in employing organizations. Theories of organizational/employee behavior used in design/implementation of pay programs. Design, implementation, and evaluation of job evaluation, salary surveys, skill-based pay, merit-based pay, and other compensation programs.

HRIR 3071. Union Organizing and Labor Relations. (2 cr)
Analysis of labor unions, employee associations, and collective bargaining within the framework of contemporary American legislation and policy. Covers forming/organizing labor unions; union, employee, and management strategies and responsibilities, historical influences on policy and practice in the private and public sectors.

HRIR 3072. Collective Bargaining and Dispute Resolution. (2 cr)
Collective bargaining, contract administration, grievance processing, interest/rights arbitration, strikes and related policies and practices of employers, workers, and labor unions in dealing with worker representation in the private and public sectors. Impact and transfer of practices to the non-union sector are considered.

HRIR 5000. Topics in Human Resources and Industrial Relations. (1-8 cr)
Selected topics of current relevance to human resource management and industrial relations.

HRIR 5021. Systems of Conflict and Dispute Resolution. (4 cr)
Introduction to theoretical and practical treatment of conflict settlement in interpersonal, work-related, community, business, and international settings. Lectures, discussions, observations of actual dispute resolution sessions, and lab exercises with students participating in dispute resolution simulations applied to real world conflicts.

HRIR 5022. Managing Diversity. (2 cr. Prereq–[[At least 50 sem cr or 75 qtr cr], 2.00 GPA] or grad student or Δ)
Ways to effectively manage increasingly diverse workforce. Human resource practices examined with respect to diversity. How to incorporate diversity into decision making to enhance organizational performance.

HRIR 5023. Personnel and Industrial Relations Law. (2 cr. Prereq–[[At least 50 sem cr or 75 qtr cr], 2.00 GPA] or grad student or Δ)
Growing body of laws and their application to

workplace: human rights, equal employment, compensation/benefit, employee protection, labor relations. Special issues (e.g., wrongful discharge, sexual harassment, defamation) discussed in context of statute, case law, and their application to work setting.

HRIR 5024. Employee Performance: Appraisal and Management. (2 cr. Prereq–[[At least 50 sem cr or 75 qtr cr], 2.00 GPA] or grad student or Δ)
How employee performance is organized, appraised, and managed to achieve organizational/individual performance goals. Job design standards, employee appraisal systems, worker satisfaction.

HRIR 5025. Comparative and International Human Resources and Industrial Relations. (2 cr. Prereq–Grad majors must register A-F)
Emergence, evolution, structures, functions, current challenges of labor movements in industrialized societies. Critical differences in key human resource management practices. Industrial relations systems, collective bargaining in comparative perspective. International Labor Organization.

HRIR 5054. Public Policy and Employee Benefits. (2 cr. Prereq–Undergrad micro economics; HRIR grad majors must register A/F)
Survey of federally/state-mandated employee benefits: worker compensation, unemployment insurance, temporary disability insurance, social security. Effects of providing benefits on workers' incentives in regard to performance, acquisition, and maintenance of human capital, mobility, and risk sharing.

HRIR 5061. Public Policies on Work and Pay. (3 cr)
Analysis of public policies regarding employment, unions, and labor markets. Public programs affecting wages, unemployment, training, worker mobility, security, and quality of work life. Policy implications of the changing nature of work.

HRIR 5991. Independent Study in Human Resources and Industrial Relations. (1-8 cr [max 8 cr]. Prereq–Δ or #)
Individual readings or research topics.

Humanities (Hum)

Department of Humanities

College of Liberal Arts

Hum 1001. Humanities in the West I. (4 cr. §3001)
Greek and Roman civilization, rise of Christianity. Epic and lyric poetry, drama, architecture, sculpture, philosophy religion. Integrative study of works by creative figures such as Homer, Hesiod. Aeschylus, Sophocles, Euripides, Aristophanes, Plato, Aristotle. Caesar, Lucretius Virgil, Ovid, Petronius, Augustine, Boethius.

Hum 1002. Humanities in the West II. (3 cr. §3002)
Sixth to Fourteenth centuries: Growth of Christendom; monasticism; feudalism and courtly love, rise of towns and universities. Art and architecture: Byzantine, Romanesque and Gothic. Music: Gregorian chant, minstrelsy, liturgical drama. Literature: epic, romance, Dante. Islam. Scholastic philosophy: Abelard, Aquinas.

Hum 1003. Humanities in the West III. (4 cr. §3003)
European civilization from 15th through 17th century. Religious/cultural reaction in northern Europe. Humanism. Counter-Reformation, religious wars. New science, philosophy. Literature, art, music. Works by creative figures such as Petrarch, Machiavelli, Erasmus, Luther, Cervantes, Descartes, Moliere. Michelangelo, Bernini, Rembrandt, Josquin, Bach.

Hum 1004. Humanities in the West IV. (3 cr. §3004)
Eighteenth-century Europe. Old Regime through French Revolution and Napoleon; new science, Enlightenment, cult of sensibility; art, music. Integrative study of works by creative figures such as Pope, Voltaire, Rousseau, Diderot, Goethe, Watteau, Boucher, Hogarth, David, Goya, Mozart, Haydn.

Hum 1005. Humanities in the West V. (4 cr. §3005)
Industrial Revolution, liberalism, socialism, romanticism. Impact of science, especially evolution theory, on religious/humanistic thought. Roots of existentialism: art, music. Wordsworth, Adam Smith, Marx, Dostoevsky, Delacroix, Courbet, Beethoven, Darwin, Nietzsche, Joyce, Monet, Wagner.

Hum 1006. Humanities in the West VI. (4 cr. §3006)
The Western world, 1914-1970. Ideas and forms of society and culture: Leninist, fascist-Nazi, Freudian. Existentialism, "the absurd"; influence of oriental spiritual traditions; art, music. Integrative study of works by creative figures such as Lenin, Freud, Kafka, Picasso, Stravinsky, Bartok, Gropius, Sartre, Ionesco, Jung, Watts, Pollock, Cage, Fellini.

Hum 1909W. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

Hum 3001. Humanities in the West I. (4 cr. §1001)
Greek and Roman civilization, rise of Christianity. Epic and lyric poetry, drama, architecture, sculpture, philosophy of religion. Integrative study of works by creative figures such as Homer, Hesiod, Aeschylus, Sophocles, Euripides, Aristophanes, Plato, Aristotle. Caesar, Lucretius Virgil, Ovid, Petronius, Augustine, Boethius.

Hum 3002. Humanities in the West II. (3 cr. §1002)
Sixth to Fourteenth centuries: Growth of Christendom; monasticism; feudalism and courtly love, rise of towns and universities. Art and architecture: Byzantine, Romanesque and Gothic. Music: Gregorian chant, minstrelsy, liturgical drama. Literature: epic, romance, Dante. Islam. Scholastic philosophy: Abelard, Aquinas.

Hum 3003. Humanities in the West III. (4 cr. §1003)
European civilization from 15th through 17th century. Religious/cultural reaction in northern Europe. Humanism. Counter-Reformation, religious wars. New science, philosophy. Literature, art, music. Works by creative figures such as Petrarch, Machiavelli, Erasmus, Luther, Cervantes, Descartes, Moliere. Michelangelo, Bernini, Rembrandt, Josquin, Bach.

Hum 3004. Humanities in the West IV. (3 cr. §1004)
Eighteenth-century Europe. Old Regime through French Revolution and Napoleon; new science, Enlightenment, cult of sensibility; art, music. Integrative study of works by creative figures such as Pope, Voltaire, Rousseau, Diderot, Goethe, Watteau, Boucher, Hogarth, David, Goya, Mozart, Haydn.

Hum 3005. Humanities in the West V. (4 cr. §1005)
Industrial Revolution, liberalism, socialism, romanticism. Impact of science, especially evolution theory, on religious/humanistic thought. Roots of existentialism: art, music. Wordsworth, Adam Smith, Marx, Dostoevsky, Delacroix, Courbet, Beethoven, Darwin, Nietzsche, Joyce, Monet, Wagner.

Hum 3006. Humanities in the West VI. (4 cr. §1006)
The Western world, 1914-1970. Ideas and forms of society and culture: Leninist, fascist-Nazi, Freudian. Existentialism, "the absurd"; influence of oriental spiritual traditions; art, music. Integrative study of works by creative figures such as Lenin, Freud, Kafka, Picasso, Stravinsky, Bartok, Gropius, Sartre, Ionesco, Jung, Watts, Pollock, Cage, Fellini.

Hum 3021. Introduction to the Historical Foundations of Modern Education. (3 cr. §4021, §EdPA 3021, §EdPA 5021)
Analysis and interpretation of important elements in modern education derived from pre-classical sources, the Greeks, Romans, Middle Ages, Renaissance, Reformation, Enlightenment, and Industrial Revolution. Basic background course.

Hum 3023. Introduction to the History of Western Educational Thought. (3 cr. §4023, §EdPA 3023, §EdPA 5023)
Great educational classics of Western civilization, by: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, and others.

Hum 3027. Lyric Song in Medieval Culture. (3 cr)
Courtly, paraliturgical, and popular song traditions, 1100-1500, in specific contexts: castle, palace, monastery, nunnery, cathedral, theater, tavern, street and countryside. Social roles of men and women as patrons, performers, poets, composers. Writing historical narratives and recreating medieval performance traditions.

Hum 3029. Music in the Twentieth Century. (3 cr)
Surveys music in European and American culture from 1890s to present. Emphasizes interactions between high art, popular and ethnic musics, contributions of men and women as composers and performers, concurrent developments in the arts, dance, and literature, music as social commentary.

Hum 3036. Islam: Religion and Culture. (3 cr)
Religion of Islam, faith, practices, sectarian splintering, expansion outside original home to status of world religion. Institutions. Status in world societies: Asia, Europe, Americas.

Hum 3256. Aesthetics, Arts, and Society: France, 1848-1900. (2 cr)
Major movements in painting, literature, and poetry in France during second half of 19th century. Aesthetic concepts of artists and their critics, in context of historical events and social and political changes.

Hum 3281. European Intellectual History: the 18th and 19th Centuries. (3 cr)
First of a two-semester course dealing with logical, philosophical and methodological issues in the historical, social and natural sciences. The period covered is from the late seventeenth century to the mid-nineteenth.

Hum 3282. European Intellectual History: the Late 19th and 20th Centuries. (3 cr)
Second and concluding semester of readings in fundamental texts dealing with issues in logic, philosophy and the methodologies of the historical, social and natural sciences, from the late nineteenth century to the present. There is no text. Readings are from original sources.

Hum 3635. Hinduism: From Guptas to 13th Century. (2 cr)
Development of classical Hinduism in its multiple cultural and social manifestations, from the 4th to 13th century C.E. Art, religion, mythology, literature, philosophy, caste system.

Hum 3677. Self-Realization in 20th-Century Western Literature. (2 cr)
Quest for meaning and process of individuation. Works by Conrad, Kate Chopin, Joyce, Sartre, Hesse.

Hum 3910. Topics in the Humanities. (2-4 cr. Prereq–Jr or sr or #)
Topics vary by offering.

Hum 3920. Honors Course: Topics in the Humanities. (2-4 cr. Prereq–Jr or Sr or #)
Topics will vary from offering to offering, and will be specified in *Class Schedule*.

Hum 3970. Directed Studies. (1-4 cr. Prereq–#)
Guided individual reading or study.

Hum 3971. Directed Studies. (1-4 cr. Prereq–#)
Guided individual reading or study.

Hum 4021. Historical Foundations of Modern Education. (3 cr. §3021, §EdPA 3021, §EdPA 5021)
Analysis and interpretation of important elements in modern education derived from pre-classical sources, the Greeks, Romans, Middle Ages, Renaissance, Reformation, Enlightenment, and Industrial Revolution. Basic background course.

Hum 4023. History of Western Educational Thought. (3 cr. §3023, §EdPA 3023, §EdPA 5023)
Great educational classics of Western civilization by: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, and others.

Hum 4837. Nietzsche. (2 cr. Prereq–Jr or sr or grad student or #)
Nietzsche's contributions to philosophy, psychology, and criticism of religion, culture, and society.

Hum 4910. Topics in the Humanities. (2-4 cr. Prereq–Jr or sr or grad)

Topics vary by offering.

Hum 4920. Honors Course: Topics in the Humanities. (2-4 cr. Prereq–Jr or Sr or Grad)
Topics will vary from offering to offering and will be specified in *Class Schedule*.

Hum 4970. Directed Studies. (1-4 cr. Prereq–Jr or Sr or Grad, #)
Guided individual reading or study.

Hum 4971. Honors Course: Directed Studies. (1-4 cr. Prereq–Jr or Sr or Grad, #)
Guided individual reading or study.

Industrial Engineering (IE)

Department of Mechanical Engineering

Institute of Technology

IE 3041. Industrial Assignment I. (2 cr; A-F only. Prereq–ME upper division, registration in ME co-op program)
Industrial work assignment in engineering intern program. Evaluation based on student's formal written report covering semester's work assignment.

IE 4042. Industrial Assignment II. (2 cr; A-F only. Prereq–ME upper div, registration in ME co-op program)
Industrial work assignment in engineering intern program. Evaluation based on student's formal written report.

IE 4043. Industrial Assignment III. (4 cr; A-F only. Prereq–4042)
Solution of system design problems that require developing criteria, evaluating alternatives, and generating a preliminary design. Final report emphasizes design communication and describes design decision process, analysis, and final recommendations.

IE 4521. Statistics, Quality, and Reliability. (4 cr. Prereq–Upper div or grad student or CNR)
Random variables/probability distributions, statistical sampling/measurement, statistical inferencing, confidence intervals, hypothesis testing, single/multivariate regression, design of experiments, statistical quality control, quality management, reliability, maintainability, availability.

IE 5080. Topics in Industrial Engineering. (4 cr. Prereq–Upper div or grad student)
Topics vary each semester.

IE 5441. Engineering Cost Accounting and Cost Control. (4 cr; A-F only)
Financial accounting, managerial accounting, engineering economics. Preparing financial statements, handling accounts payable/receivable, inventories, depreciation. Financing sources, capital cost/structure. Time value of money and of risk in managerial decision making. Design of cost accounting system and activity-based accounting.

IE 5511. Human Factors and Work Analysis. (4 cr; A-F only. Prereq–Upper div IT or grad student)
Human factors engineering (ergonomics), methods engineering, and work measurement. Human-machine interface: displays, controls, instrument layout, and supervisory control. Anthropometry, work physiology and biomechanics. Work environmental factors: noise, illumination, toxicology. Methods engineering, including operations analysis, motion study, and time standards.

IE 5512. Applied Ergonomics. (4 cr; A-F only. Prereq–Upper div IT or grad student, 5511)
Small groups of students work on practical ergonomic problems in local industrial firms. Projects cover a variety of ergonomic issues: workstation design, equipment and tool design, back injuries and material handling, cumulative trauma disorders, illumination and noise, and safety.

IE 5513. Engineering Safety. (4 cr; A-F only. Prereq–Upper div IT or grad student)
Occupational, health, and product safety. Standards, laws, and regulations. Hazards and their engineering control, including general principles, tools and machines, mechanics and structures, electrical safety, materials handling, fire safety, and chemicals. Human behavior and safety, procedures and training, warnings and instructions.

IE 5522. Quality Engineering and Reliability. (4 cr. Prereq–[4521 or equiv], [upper div or grad student or CNR])
Quality engineering/management, economics of quality, statistical process control design of experiments, reliability, maintainability, availability.

IE 5531. Engineering Optimization I. (4 cr. Prereq–Upper div or grad student or CNR)
Linear programming, simplex method, duality theory, sensitivity analysis, interior point methods, integer programming, branch/bound/dynamic programming. Emphasizes applications in production/logistics, including resource allocation, transportation, facility location, networks/flows, scheduling, production planning.

IE 5541. Project Management. (4 cr. Prereq–Upper div or grad student)
Project screening/selection, multiple-criteria methods for project evaluation, project structuring/work breakdown, project teams, project scheduling, resource management, life-cycle costing, project control, project termination, research/development projects, computer support for project management.

IE 5545. Decision Analysis. (4 cr. Prereq–4521 or equiv)
Normative theories of decision making. Emphasizes structuring of hard decision problems arising in business and public policy contexts. Decision trees, expected utility theory, screening prospects by dominance, assessment of subjective probability, multiple attribute utility, analytic hierarchy process, benchmarking with data envelopment analysis, basics of game theory.

IE 5551. Production Planning and Inventory Control. (4 cr. Prereq–CNR or upper div or grad student)
Inventory control, supply chain management, demand forecasting, capacity planning, aggregate production and material requirement planning, operations scheduling, and shop floor control. Quantitative models used to support decisions. Implications of emerging information technologies and of electronic commerce for supply chain management and factory operation.

IE 5552. Design and Analysis of Manufacturing Systems. (4 cr. Prereq–Upper div or grad student)
Flow lines, assembly systems, cellular manufacturing systems, and flexible manufacturing systems. Emphasis is on methodologies for modeling, analysis and optimization. Lead time analysis, capacity and workload allocation, scheduling and shop floor control, work-in-process management, facilities planning and layout, and information management.

IE 5553. Simulation. (4 cr. Prereq–CNR or upper div or grad student)
Discrete event simulation. Using integrated simulation/animation environment to create, analyze, and evaluate realistic models for various manufacturing, assembly, and material handling systems. Experimental design for simulation. Random number generation. Selecting input distributions. Evaluating simulation output.

Information and Decision Sciences (IDSc)

Department of Information and Decision Sciences

Curtis L. Carlson School of Management

IDSc 3001. Information Systems for Business Processes and Management. (3 cr; A-F only. Prereq–[BA 1001 or experience using Windows/Internet], 50 cr)
Developing/using IS to support business processes, management, and decision making. Technology components of IS, impact on organizations, creation/change processes, managerial issues. Techniques for designing, developing, implementing systems. Databases and user interfaces. Computer and communications network platforms.

IDSc 3201. Information Systems Application Development. (4 cr; A-F only. Prereq–3001, MIS major)
User interface design and development, database design and querying, operating environments. Introduction to programming and program design. Hands-on experience with selected application system development tools. Follows the systems development experience from design and construction through testing and deployment.

IDSc 3202. Analytical Skills for Business Application Development. (4 cr; A-F only. Prereq–3001)
Concepts/methods for business process engineering and systems analysis. Techniques, activities, and issues for management/control of systems development at project level. Traditional and object-oriented analysis.

IDSc 4102. Introduction to Information Systems Analysis. (3 cr; A-F only. Prereq–3001)
Life cycle for development of an information system application. Standards, tools, and techniques required in analysis of information requirements and in logical information systems design. Processing alternative approaches to systems design.

IDSc 4103. Database Design, Manipulation, and Management. (3 cr; A-F only. Prereq–3001)
Use of computer technology and software to represent, manipulate, and manage data. Facilities for ad hoc interactive use and system development. Principles and techniques of logical database design. Introduction to physical representation and storage of data. DBMS tools to manage data and high-level languages to retrieve and manipulate data.

IDSc 4131. Advanced Database Design and Administration. (3 cr; A-F only. Prereq–4103)
Role, organization, functions, and tools of data administration. Data planning and information architectures. Object-oriented DBMS and support for graphics and CAD/CAM applications. Data security, maintaining database integrity, and managing data shared, networked or distributed environment. Strategies for using advanced DBMS tools and CASE tools.

IDSc 4151. Data Communications Systems. (3 cr; A-F only. Prereq–4102)
Characteristics of transmission facilities and networks, concentrators and multiplexors, terminals, modems, and front end processors. Control hardware and software systems. The role of data communications in management information systems.

IDSc 4153. Telecommunications: Domestic and International Policy and Regulation. (3 cr; A-F only. Prereq–3001)
Regulation and policy making in telecommunications. Evolution of the industry. Industry structure. Models for policy. Roles and relationships of U.S. standards organizations, the telecommunications industry, and governmental units. Evolution of international telecommunications organizations and regulatory systems. Analysis of current issues.

IDSc 4203. Information Technology Infrastructure. (4 cr; A-F only. Prereq–3202)
Technology and infrastructure for developing large-scale information systems. Processes to identify, evaluate, and select appropriate infrastructure components for an information system implementation. Application of systems analysis and design techniques in a class project.

IDSc 4204. Information Services Management. (2 cr; A-F only. Prereq–3202)
Information services as a function. Conceptual basis. Relationship of function, roles, and organizational

structures. IS planning/business strategy, skill development, career pathing. Management of acquisition, subcontracting, outsourcing, operations, and user support.

IDSc 4421. Financial Information Systems and Technologies. (2 cr; A-F only. Prereq–3001)
IS in financial services, corporate financial operations, and investment management. Traditional vs. electronic financial markets, computerized trading, digital sources of financial data, electronic money, and decision technologies in financial services. Software development skills for personal investments.

IDSc 4431. Advanced Database Design. (2 cr; A-F only. Prereq–3202)
Comparative review of data modeling methodologies. Advanced constructs in database design. Modeling subtypes and supertypes, ternary and higher-order relationships, integrity constraints. CASE tools; representation of facts; verbalization of a data model for human understanding and validation.

IDSc 4432. Advanced Database Management and Administration. (2 cr; A-F only. Prereq–4431 or ¶4431)
Managing information resources. Data planning, global information architectures. Advanced data manipulation languages, comprehensive DBMS facilities, and O-O DBMS. Analysis and data mining tools. Deploying/managing databases in a distributed environment. Data integrity, security, and privacy.

IDSc 4441. Electronic Commerce. (2 cr; A-F only. Prereq–3001, 90 cr)
Service relationships as a conceptual basis. Evolutionary execution strategy based on application of business principles of key functions using proven product development practices. Measurement/evaluation principles/practice. Case studies from advertising, marketing, and fulfillment functions.

IDSc 4451. Telecommunications Fundamentals and Applications. (2 cr; A-F only. Prereq–3202)
Concepts and terminology of electronic communications. Media, signaling, data linking, and networking concepts and protocols. Technology including fiber optics, satellites, and wireless. Business uses and management issues. Public networks and carrier systems, telecommunications industry, regulation, and standards.

IDSc 4452. Data Communications and Networks. (2 cr; A-F only. Prereq–¶4451)
Structure of local and wide-area data communications networks. LAN architecture, protocols, and devices. WAN interconnections via frame relay and ATM. LAN operating systems structure and operations. The Internet and intranets. Network administration issues. EDI and electronic commerce and security.

IDSc 4490. Information Systems Special Topics. (2 cr [max 10 cr]; A-F only. Prereq–3202)
Discussion and analysis of current topics and developments in information systems.

IDSc 4491. Independent Study in Information Systems. (1-4 cr; A-F only. Prereq–#)

IDSc 4496. Information Systems Industry Internship. (2 cr; A-F only. Prereq–¶3202, Δ)
Learning by working in IS activities and receiving appropriate training from a sponsoring organization. Custom designed to meet pre-established learning objectives. "Work practice" plan required and must be approved by the organization and the director of IDSc undergraduate studies.

Information Networking (INet)

College of Continuing Education

INet 4010. Network Administration. (4 cr; A-F only. Prereq–CSci 5211 or #)
Network architecture, switching, routing, algorithms, protocols, infrastructure hardware, cable plant, security, network management. Lecture, expert guest speakers, labs.

INet 4011. Network Administration. (4 cr; A-F only. Prereq–CSci 5211 or #)
Network architecture, switching, routing, algorithms, protocols, infrastructure hardware, cable plant, security, network management. Lecture, expert guest speakers, labs.

INet 4021. Network Programming. (4 cr; A-F only)
Network/distributed programming concepts. Design using C, Java, and other higher level programming languages. Sockets, TCP/IP, RPC, streaming, CORBA,.NET, SOAP. Labs use UNIX/Linux and MS Windows operating systems.

INet 4031. System Administration. (4 cr; A-F only)
Server and data storage architecture, SCSI, Fibre Channel, RAID, stripping. Configuring hardware/software for server and for data storage farms. Operational factors, including backup/recovery.

INet 4041. Emerging Network Technologies and Applications. (3 cr; A-F only. Prereq–CSci 5211 or #)
Underlying theory. Driving needs (technological, business). Developing technology. Competing technologies. Lectures by guest expert speakers, case studies, labs.

INet 4051. I.T. Infrastructure Operations (Capstone). (3 cr; A-F only. Prereq–[CSci 52II or one info networking course], sr)
Network, server and database operations. Infrastructure architecture, organizational structure, security, metrics, vendor relations, outsourcing, capacity planning, strategic planning, budgeting. Online, case study.

INet 4061. Introduction to Data Warehousing. (3 cr; A-F only. Prereq–CSci 4707 or #)
Data warehouse architecture. Star schema and dimensional modeling. Extract-Load-Transform processes. Query design. Administration/operation. Lecture, lab.

INet 4193. Directed Study. (1-4 cr [max 12 cr])
Topic arranged with IN/NA academic adviser

INet 4707. Practice of Database Systems. (3 cr. Prereq–B.A.S. student in [INet or INA or ITI]; A-F only)
Concepts, data models. Case studies, data manipulation languages, logical data models, database design, facilities for database security/integrity, applications.

Institute of Technology (IofT)

Institute of Technology

IofT 0001. Fundamentals of Engineering Review (E.I.T. Refresher). (0 cr; S-N only. Prereq–Bachelor's degree in engineering)
For engineering graduates who are preparing for the Engineer-in-Training examination, the first of two written exams required for registration as a professional engineer. Review of mathematics, chemistry, materials, statics, dynamics, strength of materials, thermodynamics, electric circuits, fluid mechanics, and engineering economics.

IofT 1101. Environmental Issues and Solutions. (4 cr. Prereq–[High school chemistry or equiv], one yr high school algebra)
Importance of science in understanding/solving various environmental problems. Case studies. Laboratory exercises.

IofT 1312. Exploring Careers in Science and Engineering. (2 cr)
Career development self assessment, career decision making, writing resumes and cover letters, identifying/contacting employers, interviewing. Using Career Services to find internships, co-ops, and permanent positions. Topics presented by employers and by Career Services staff.

IofT 1901. Freshman Seminar, Environment. (1-3 cr [max 4 cr]; A-F only)
Topics vary. See *Class Schedule*.

IofT 1904. Freshman Seminar: International Perspective. (1-3 cr [max 4 cr]; A-F only)
Topics vary. See *Class Schedule*.

IofT 1905. Freshman Seminar. (1-3 cr [max 4 cr])
Topics vary. See *Class Schedule*.

IofT 1906. Freshman Seminar: Environment/Writing Intensive. (1-3 cr [max 4 cr]; A-F only)
Topics vary. See *Class Schedule*.

IofT 1909W. Freshman Seminar, International Perspective/Writing Intensive. (1-3 cr [max 4 cr]; A-F only)
Topics vary. See *Class Schedule*.

IofT 1910W. Freshman Seminar, Writing Intensive. (1-3 cr [max 4 cr]; A-F only)
Topics vary. See *Class Schedule*.

Insurance (Ins)

Industrial Relations Center

Curtis L. Carlson School of Management

INS 5000. Personal Financial Planning 2: Tax and Estate Planning Techniques. (2 cr. Prereq–5201)
In-depth treatment of estate planning and tax management techniques introduced in 5201. Charitable giving, probate process, use of health care directives, durable powers of attorney, revocable/irrevocable trusts, wills, asset distribution.

Ins 5100. Corporate Risk Management. (2 cr)
Theory applied to corporate risk management and insurance practices. Identification, measurement, and treatment of an organization's financial risks integrated with its property, liability, workers compensation, and human resource risks. Selection and application of risk control and risk financing tools: risk retention, reduction and transfer, including insurance.

Ins 5101. Employee Benefits. (2 cr. Prereq–5100 or HRIR 3021 or #)
Design/administration of employee benefit plans and pension programs: health insurance, disability plans, salary reduction/deferred compensation programs—from social insurance to executive benefits. Multiple employer trusts. Alternative funding methods, including self-insurance. Ethical issues, legal liability, compliance with regulations.

Ins 5200. Insurance Theory and Practice. (2 cr)
Risk theory is applied to practices in health, liability, life, property, and workers compensation insurance. Insurance marketing, pricing, underwriting, and claims administration, with adverse selection and moral hazard effects. Policy issues of tort versus no-fault compensation systems. Self-insurance and integrated risk financing methods.

Ins 5201. Personal Financial Management. (2 cr)
Personal financial planning. Financial statements, cash flow/debt analysis, time value of money. Management of liability, disability, life, medical, and property risks. Investments, portfolio management. Tax reduction, employee benefits, retirement/estate planning. Ethical issues, regulation of financial planners.

Inter-College Program (ICP)

College of Continuing Education

ICP 3075. Directed Study. (1-15 cr)
Independent, directed study.

Interdepartmental Study (ID)

Career and Community Learning Center

College of Liberal Arts

For definitions of course numbers, symbols, and abbreviations, see page 296.

ID 3211. Internship: Perspectives on Work. (4 cr. Prereq–Δ, internship through Career and Community Learning Center)
Combines practical experience in an internship with reflection upon work in our society. Organizational structure, work as a cultural phenomenon, history of concepts of work, relationship of work to broader demands of citizenship.

ID 3301. Introduction to Marxism. (3 cr)
Marxist philosophy as a worldview and methodology for study of processes in nature, society, and thought; linkage between technological development and evolution of class-divided societies; economic theory of capitalism and socialism; transition to socialism theory and practice; racism, sexism, homophobia, and national conflicts; aesthetics.

ID 3311. Museum Exhibits: From Initial Vision to Practical Implementation. (2 cr. Prereq–#)
Introduces students to museum exhibit development culminating in the students designing a science exhibit. Study content research, educational strategies of informal science education, design, production stages, marketing, and evaluation. Multidisciplinary involving teachers in graphic art, biology, communication, marketing, science education, and others.

ID 3321. AIDS/HIV: Ethical Issues. (3 cr)
Multidisciplinary examination of AIDS/HIV in cultural context. Ethical issues in educational, medical, and political responses to AIDS. Community resources available to people with HIV. Local debates about who gets what services. Required group service project in the community.

ID 3395. OMSSA: Pre-Law Program. (4 cr. Prereq–#)
Non published course. OMSAA program for selected students to participate in a summer exchange program with William Mitchell Law School.

ID 3501. Community, Service, and Self: Dynamics of Gender, Race, and Class. (2 cr. Prereq–Δ)
First half of a year-long course designed to complement students' volunteer experience in local communities. Examine community development and "community service" theory across cultures while applying them to direct service experience. Students volunteer 2-3 hours per week.

ID 3502. Community, Service, and Self: Dynamics of Gender, Race, and Class. (2 cr. Prereq–3205)
Second half of a year-long course designed to complement students' volunteer experience in local communities. Examine community development and "community service" theory across cultures while applying them to direct service experience. Students volunteer 2-3 hours per week.

ID 3551. Metro Internship Seminar: Corporate Social Responsibility and Ethical Leadership. (6 cr. Prereq–#)
Cross disciplinary course combining theoretical work with a ten-week internship in a local corporation. Focus is on ethics, leadership, organizational change, and strategies for bringing about social change.

ID 3571. HECUA Off-Campus Study Program: Metro Urban Studies Term Reading Seminar. (4 cr. Prereq–¶3572, ¶3573, Δ; contact CCLC, 345 FraserH, 626-2044)
Roots/strategies for addressing urban inequality/poverty. Interdisciplinary field study, seminar work, internship.

ID 3572. HECUA Off-Campus Study Program: Metro Urban Studies Term Field Seminar. (4 cr. Prereq–¶3571, ¶3573, Δ; contact CCLC, 345 FraserH, 626-2044)
Roots/strategies for addressing urban inequality/poverty. Interdisciplinary field study, seminar work, internship.

ID 3573. HECUA Off-Campus Study Program: Metro Urban Studies Term Internship Seminar. (8 cr. Prereq–¶3571, ¶3572, Δ; contact CCLC, 345 FraserH, 626-2044)
Roots/strategies for addressing urban inequality/poverty. Interdisciplinary field study, seminar work, internship.

ID 3581. HECUA Off-Campus Study Program: City Arts Reading Seminar. (4 cr. Prereq–¶3582, ¶3583; Δ; contact CCLC, 345 FraserH, 626-2044)
Arts, popular culture, social change. Interdisciplinary field study, seminar work, internship. Offered each spring semester.

ID 3582. HECUA Off-Campus Program: City Arts Field Seminar. (4 cr. Prereq–¶3581, ¶3583, Δ; contact CCLC, 345 FraserH, 626-2044)
Arts, popular culture, social change. Interdisciplinary field study, seminar work, internship. Offered each spring semester.

ID 3583. HECUA Off-Campus Program: City Arts Internship Seminar. (8 cr. Prereq–¶3581, ¶3582, Δ; contact CCLC, 345 FraserH, 626-2044)
Arts, popular culture, social change. Interdisciplinary field study, seminar work, internship. Offered each spring semester.

ID 3993. Directed Study. (1-4 cr [max 8 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Interdisciplinary Archeological Studies (InAr)

College of Liberal Arts

InAr 5100. Topics in Interdisciplinary Archaeological Studies. (3 cr; A-F only. Prereq–InAr grad major or #)
Topics specified in the *Class Schedule*.

Italian (Ital)

Department of French and Italian

College of Liberal Arts

Ital 0001. Reading Italian in the Arts and Sciences. (0 cr)
Designed to teach a basic reading knowledge of the Italian language; full time is devoted to intensive reading and translation of texts from a wide variety of disciplines and to the teaching of translation techniques.

Ital 1001. Beginning Italian. (5 cr)
Emphasis on the four language skills (listening, speaking, writing, and reading) and on Italian culture.

Ital 1002. Beginning Italian. (5 cr)
Emphasis on the four language skills (listening, speaking, writing and reading) and on Italian culture.

Ital 1003. Intermediate Italian. (5 cr. Prereq–1001-1002)
Grammar review and development of intermediate level of proficiency in listening, reading, writing and speaking. Emphasis on some cultural aspects of contemporary Italy.

Ital 1004. Intermediate Italian. (5 cr. Prereq–1101-1102)
Grammar review and development of intermediate level of proficiency in listening, reading, writing and speaking. Emphasis on some cultural aspects of contemporary Italy.

Ital 1737. Friends and Countrymen. (3 cr)
Study of the problematic relation between friendship and citizenship as formulated by Dante in the "Inferno" and as we may interpret it in analyzing today's civic issues. Attention to Dante's reliance on and implicit critique of Aristotle's "Nicomachean Ethics." Taught in English.

Ital 3015. Reading, Conversation, and Composition. (4 cr. Prereq–1004)
Intensive reading, writing, speaking practice. Study of cultural materials in authentic formats.

Ital 3201. Reading Italian Texts: Poetics, Rhetoric, Theory. (3 cr. Prereq–3015)
A basic course in understanding the rhetorical and poetic aspects of language and literature; interpretive methods and theoretical concepts.

Ital 3203. Italian Travelers: From the Enlightenment to the Present. (3 cr. Prereq–3015)
Examines literary representations of travel, migration, immigration, exile, and tourism in Italy from the Enlightenment to the present.

Ital 3209. Literature of Medieval City-States. (4 cr. Prereq–3015)
The beginnings of Italian vernacular literature in the context of the city-states of the 11th to 14th centuries.

Ital 3219. Literature of the Despotisms. (4 cr. Prereq–3015)
Prose, verse, and drama of Italy under the Signorie and foreign invaders, 1400-1650.

Ital 3301. Italian Dialects and Their Literature. (4 cr. Prereq–3015)
Study of selected Italian dialects and dialect texts in their cultural and historical settings.

Ital 3305. Staging the Self: Theater and Drama in Modern Italy. (4 cr. Prereq–3015)
Theatrical representations of the self in modern Italy. Particular attention given to issues of identity, gender, and class in theatrical works ranging from Alfieri's Mirra, Pirandello's Enrico IV to Dacia Maraini's Clyteminestra.

Ital 3501. The World in the City: Italy 1100-1660. (3 cr. Prereq–3015)
The culture and civilization of Italian cities in medieval and early modern periods.

Ital 3502. Making of Modern Italy: From the Enlightenment to the Present. (3 cr. Prereq–3015)
Italian literary, cultural, and symbolic practices from the Enlightenment to the present.

Ital 3806. Negotiating the Terms: Italian Film and Literature. (3 cr)
Examines cinematic representations of Italian literary texts; introduces the basic tools of literary and film analysis; discusses how both media impact Italian culture. Taught in English.

Ital 4303. Drama and Spectacle in Italy, 1200-1770. (4 cr. Prereq–3015)
Italian drama, festival and spectacle from the medieval sacred plays to the reform of the theater by Goldoni.

Ital 4307. Novellistica. (3 cr. Prereq–3201, or permission of DUS)
Study of birth and development of the novella genre. Reading and discussion of stories form the Novellino, Boccaccio, Sacchetti, Bandello, Bigolini, Basile, Verga, Deledda, Calvino, Introduction to formal study of novella structure.

Ital 4970. Directed Readings. (1-4 cr. Prereq–#)
Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written and other work required.

Ital 5209. Trecento Literature: Ruling the Canon. (4 cr. Prereq–3015, 3201 or #)
Works of Boccaccio and Petrarch and their role in establishing the canon of Italian vernacular literature. Taught in English also as MeSt 5610.

Ital 5289. The Narrow Door: Women Writers and Feminist Practices in Italian Literature and Culture. (4 cr. Prereq–3015)
Focuses on issues of gender, sexual difference, equality, and emancipation raised by Italian women writers and thinkers from the 19th century to the present.

Ital 5321. Italian Renaissance Epic. (4 cr. Prereq–3015, 3201 or #)
Study of the narrative poems of Boiardo, Ariosto, and Tasso in the context of the fashioning of early modern Europe.

Ital 5337. Nation and Narration: Writings in the 19th Century. (4 cr. Prereq–3015)
Introduces the construction of modern Italian national identity by examining the role that literature plays in this process. Works by Manzoni, Foscolo, Leopardi, Gioia, Verga, Serao, and Deledda studied in the context of a range of sociopolitical and cultural issues.

Ital 5401. Mondo di Dante. (4 cr. Prereq–3015, 3201 or #)
Intensive reading of Dante's Inferno, Purgatorio, and Vita Nuova with emphasis on Dante's linguistic and cultural contributions.

Ital 5609. World of Dante. (4 cr [max 8 cr])
Taught in English. Intensive reading of Dante's Inferno, Purgatorio, and Vita Nuova with emphasis on the personal, poetic, and political stakes of the journey of Dante's pilgrim through hell to the earthly paradise.

Ital 5970. Directed Readings. (1-4 cr [max 16 cr]. Prereq–#)
Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written and other work required.

Japanese (Jpn)

Department of Asian Languages and Literatures
College of Liberal Arts

Jpn 4062. Classical Japanese. (4 cr. Prereq–4061 or #)
Analysis of the structures and arguments of classical Japanese poetry, narrative, and drama.

Jpn 5040. Readings in Japanese Text. (2-4 cr [max 12 cr]; A-F only. Prereq–4041 or equiv or #)
Students read authentic materials of various types to increase reading/speaking ability. Topics specified in *Class Schedule.*

Jpn 5071. Communicative Competence for Japan-Oriented Careers. (4 cr. Prereq–4041 or 4042 or #)
Effective communication using spoken and written Japanese in contexts likely to be encountered by a career-oriented professional in Japan.

Jpn 5072. Communicative Competence for Japan-Oriented Careers. (4 cr. Prereq–5071 or #)
Effective communication using spoken and written Japanese in contexts likely to be encountered by a career-oriented professional in Japan.

Jpn 5160. Topics in Japanese Literature. (4 cr [max 8 cr])
Literary, historical, or cultural study of selected Japanese literature.

Jpn 5161. Women's Writing in Premodern Japan. (4 cr; A-F only. Prereq–3162, 4061 or # when readings are in Japanese; 3162 or # when in translation)
Works by women in premodern Japan including Genji monogatari, a lengthy narrative, Makura no soshi, a collection of vignettes, and poetry. Concerns include gendered writing system/authorship, narrative techniques, sexuality and the figure of the author, and strategies of fictionality.

Jpn 5162. Tale Literature in Premodern Japan. (4 cr; A-F only. Prereq–3162, course from classical Japanese language sequence or #)
Tale literature, both Buddhist and secular, presents the world of the middle- to lower-class people. Rhetoric and religion, fiction and history, gender and sexuality, the role of the supernatural/fantastic, and re-tellings of earlier texts.

Jpn 5163. Premodern Historical Narratives. (4 cr; A-F only. Prereq–3162, course from classical Japanese language sequence or #)
Narratives rooted in history. Issues include the problematization of reality, the formation of national identity, the idea of divine Imperial power, oral storytelling and its relationship to written texts, and the popularization of historical writings.

Jpn 5164. Readings in Early Modern Japanese Literature. (4 cr; A-F only. Prereq–3032 when readings are in Japanese or #)
An examination of the stylistic and ideological aspects of the prose fiction, poetry, and non-fiction of the period 1863 to 1945. Offered in a rotating format alternating between readings in the original language and readings in English translation.

Jpn 5165. Readings in Postwar and Contemporary Japanese Literature. (4 cr; A-F only. Prereq–3032 when offered in Japanese or #)
Literary and historical exploration of selected works published between 1945 and the present. Focus may be on a writer, a period, or a theme. Offered in a rotating format alternating between readings in the original language and readings in English translation.

Jpn 5166. Literature by 20th-Century Japanese Women. (4 cr. Prereq–3032 or #)
Literary and historical exploration of selected works by Japanese women writers in a variety of genres. All literary texts read in Japanese; critical readings may be in English.

Jpn 1011. Beginning Japanese. (6 cr)
An introduction to speaking, reading, and writing Japanese.

Jpn 1012. Beginning Japanese. (6 cr. Prereq–1011)
Introduction to speaking, reading, and writing Japanese.

Jpn 3001. Japanese Calligraphy and Appreciation I. (2 cr. Prereq–1011)
Basic tools (e.g., brush, sumi ink stick, rice paper). Practice in basic brush strokes. Different characters or hiragana in expressions that are appropriate for the season or that have cultural significance. Taught entirely in Japanese.

Jpn 3002. Japanese Calligraphy and Appreciation II. (2 cr. Prereq–3001 or #)
Tools used in Japanese calligraphy (e.g., brush, sumi ink stick, rice paper). Basic brush strokes. Talk about/appreciation of calligraphy. Different characters or hiragana in expressions that are appropriate for the season or that have cultural significance. One-to-one feedback on practice calligraphy. Taught entirely in Japanese.

Jpn 3021. Intermediate Japanese. (5 cr. Prereq–1012 or #)
Intermediate speaking, reading, and writing in Japanese.

Jpn 3022. Intermediate Japanese. (5 cr. Prereq–3021 or #)
Intermediate-level instruction in speaking, reading, and writing in Japanese.

Jpn 3031. Third-Year Japanese. (4 cr. Prereq–3022 or #)
Advanced intermediate-level instruction in speaking, reading, and writing Japanese. Development of reading proficiency in modern Japanese prose.

Jpn 3032. Third-Year Japanese. (4 cr. Prereq–3031 or #)
Advanced intermediate-level instruction in speaking, reading, and writing Japanese. Development of reading proficiency in modern Japanese prose.

Jpn 3090H. Honors Course: Tutorial. (1-4 cr)

Jpn 3162. Traditional Japanese Literature in Translation. (3 cr. Prereq–No knowledge of Japanese necessary)
Survey of texts in different genres from the 8th to the early 19th centuries, with attention to issues such as "national" identity, gender and sexuality, authorship, and popular culture.

Jpn 3163. Early Modern Japanese Literature in Translation. (3 cr)
Survey of the principal authors and genres of the period spanning Japan's opening to the West (1860s) to World War II. Writers include Natsume Soseki, Shiga Naoya, Kawabata Yasunari, and Tanizaki Junichiro.

Jpn 3164. Postwar Japanese Literature in Translation. (3 cr. Prereq–Basic knowledge of modern Japanese history helpful; knowledge of Japanese language not required)
Survey of the ideas and styles of recent Japanese literature. Writers include Dazai Osamu, Ibuse Masuji, Oe Kenzaburo, Mishima Yukio, and Yoshimoto Banana. All readings in English translation.

Jpn 3165. Japanese Performance Arts. (3 cr)
Japanese performance traditions with emphasis on Noh, Kabuki, and Bunraku in their literary and cultural contexts. The relationship between these traditions and the evolution of avant-garde performance practices.

Jpn 3166. Japanese Film. (3 cr)
Themes, stylistics, and genres of Japanese cinema through the work of classic directors (Kurosawa, Mizoguchi, and Ozu) and more recent filmmakers (Itami and Morita). Particular attention to representations of femininity and masculinity.

Jpn 3167. Re-examining "Geisha Girls". (3 cr)
Critically investigates conceptions/representations of Japanese women entertainers, commonly termed "geisha." Literary texts, visual/performing arts, film. Premodern/modern Japanese examples, examples from the United States.

Jpn 3451. Introduction to Japanese Linguistics. (3 cr. Prereq–3022 or #)
Analysis of structure and meaning of Japanese sentence patterns.

Jpn 3900. Topics in Japanese Literature. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule.*

Jpn 3920. Topics in Japanese Culture. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule.*

Jpn 3993. Directed Studies. (1-15 cr [max 15 cr]. Prereq–#, Δ, ❑)
Directed study in topics of Japanese literature or linguistics.

Jpn 4041. Advanced Japanese Conversation and Composition. (4 cr. Prereq–3032 or #)
Practice in advanced spoken and written Japanese. Typical assignments include essays, summaries, and formal interviews in Japanese.

Jpn 4042. Advanced Japanese Conversation and Composition. (4 cr. Prereq–4041 or #)
Practice in advanced spoken and written Japanese. Typical assignments include essays, summaries, and formal interviews in Japanese.

Jpn 4061. Classical Japanese. (4 cr. Prereq–3021, 3022)
Study of the structures and arguments of classical Japanese poetry, narrative, and drama.

Jpn 5171. Women's Writing in Premodern Japan in Translation. (4 cr; A-F only. Prereq–3162 or #)
Genji monogatari, a lengthy narrative, Makura no soshi, a collection of vignettes, and poetry. Gendered writing system/authorship, narrative techniques, sexuality and the figure of the author, and strategies of fictionality.

Jpn 5176. Literature by 20th-Century Japanese Women in Translation. (4 cr)
Literary and historical exploration of selected works by Japanese women writers in a variety of genres. All literary texts read in English.

Jpn 5251. History of the Japanese Language. (4 cr. Prereq–3032, 5451 or #)
Development of Japanese grammar from classical to the modern language.

Jpn 5451. Structure of Japanese: Syntax/Semantics. (4 cr. Prereq–3032, Ling 3001 or #)
Analysis of structure and meaning of Japanese sentence patterns.

Jpn 5452. Structure of Japanese: Phonology/Morphology. (4 cr. Prereq–3032, Ling 3001 or #)
Generative and nongenerative approaches to Japanese sound and word structure.

Jpn 5453. Structure of Japanese: Discourse/ Conversation Analysis. (4 cr. Prereq–3032, Ling 3001 or #)
Analysis of Japanese written texts and conversations. Emergence of grammar in discourse, discourse/ conversational structural units, patterns genre, strategies, style, and sociolinguistics variables.

Jpn 5650. Proseminar: Japanese Linguistics. (4 cr [max 12 cr]. Prereq–5451 or 5452 or 5453 or #)
Selected topics in Japanese linguistics and/or contrastive analysis of Japanese and English with attention to contributions from Eastern and Western linguistic traditions.

Jpn 5993. Directed Studies in Japanese. (1-15 cr [max 15 cr]. Prereq–#, Δ, ❑)
Individual study with guidance of a faculty member.

Jewish Studies (JwSt)

Department of Classical and Near Eastern Studies

College of Liberal Arts

JwSt 1034. Introduction to Judaism. (3 cr. §3034, §RelA 1034, §RelA 3034. Prereq–No knowledge of Hebrew required)
Survey of intellectual history, literature, beliefs, practices, values, laws, national, and cultural developments from the rabbinic period through today. Ancient and modern sources used to study Judaism. Combines Western critical methodologies with the Jewish traditions of learning.

JwSt 1083. Jesus the Jew. (3 cr. §3083, §Clas 1083, §Clas 3083, §RelA 1083, §RelA 3083)
Historic figure of Jesus within context of first century Palestinian Judaism. Main groups/ institutions of Judaism at time of Jesus. Rabbinic literature/traditions. Works describing Jesus' life/ sayings (synoptic gospels). Jesus and the Law, Messianic ideals/expectations, problem of religious authority. Positions regarding Rome, its authority. James and the Jerusalem Church.

JwSt 3013W. Biblical Law and Jewish Ethics. (3 cr. §5013, §RelA 3013, §RelA 5013)
Significance of religious law in Judaism. Babylonian background of biblical law. Biblical creation of the person as a legal category. Rabbinic transformations of biblical norms. Covenant in Christianity/Islam. Contemporary Jewish literature/philosophy.

JwSt 3034. Introduction to Judaism. (3 cr. §1034, §RelA 1034, §RelA 3034. Prereq–No knowledge of Hebrew required)
Survey of intellectual history, literature, beliefs, practices, values, laws, national, and cultural developments from the rabbinic period through today. Ancient and modern sources used to study Judaism. Combines Western critical methodologies with the Jewish traditions of learning.

JwSt 3083. Jesus the Jew. (3 cr. §1083, §Clas 1083, §RelA 1083, §RelA 3083)
Historic figure of Jesus within context of first century Palestinian Judaism. Main groups/ institutions of Judaism at time of Jesus. Rabbinic literature/traditions. Works describing Jesus' life/ sayings (synoptic gospels). Jesus and the Law, Messianic ideals/expectations, problem of religious authority. Positions regarding Rome, its authority. James and the Jerusalem Church.

JwSt 3112. Jewish Mysticism, Magic, and Kabbalah. (3 cr; A-F only)
Mystical traditions from early rabbinic traditions to Zohar (Book of Splendor) in 13th century. Literature of heavenly ascent (Hekhalot, Merkavah), Book of Creation (Sefer Yetzirah), precursors of Zohar—the Bahir. Schools of Provence, Gerona, and Zohar. Tension between legal/mystical aspects, magical theurgic techniques, evolution of doctrine of Sefirot, mystical interpretation of Scripture, erotic dimension.

JwSt 3113. African American and Jewish American Relations in the United States. (3 cr)
Historical and social scientific study of relations between African Americans and Jewish Americans in the U. S. during the 20th century. Includes immigration, work, cultures, gender, and alliance, and conflict.

JwSt 3115. Mishnah and Midrash in Translation. (3 cr. §RelA 3115)
Jewish law studied as a mirror of society and as a way to actualize its value. Consideration of original socioreligious contexts and current applications. Selections include biblical interpretations addressing moral, theological, legal, and literary problems.

JwSt 3126. Judaism in the Modern World. (3 cr. §RelA 3126)
Jewish theology, religion, and ideology in the 19th and 20th centuries. American Judaism: orthodox, conservative, reform, reconstructionist; religious and communal organizational structures. Zionism in Europe, Israel, and America. Hasidism. Jewish responses to feminism and the democratic ideal.

JwSt 3315. Contemporary Israeli Literature in English. (3 cr. Prereq–Knowledge of Hebrew not required)
Modern short stories and poetry. Works of Agnon, Yizhar, Hazaz, Yhehoshua, Greenberg, Amihai, Pagis, and others. Alienation, the crisis of faith, war, holocaust, Jews and Arabs.

JwSt 3401. The Art and Architecture of the Jewish People. (3 cr)
Jewish art and architecture from antiquity to 7th-century C.E. Issues include Jewish art and the Second Commandment, non-Jewish artistic traditions, the nature of Jewish art.

JwSt 3521W. History of the Holocaust. (3 cr)
Study of the 1933-1945 extermination of six million Jews and others by Nazi Germany on the basis of race. European anti-Semitism, implications of social Darwinism and race theory, perpetrators, victims, onlookers, resistance, and theological responses of Jews and Christians.

JwSt 3522. History of the Arab-Israeli Conflict. (3 cr)
The events leading to the re-establishment of the State of Israel in 1948 and subsequent conflicts and negotiations up to present. Zionism and Arab resistance, Great Powers' involvement, War of Independence/First Palestine War, subsequent conflicts and their aftermath.

JwSt 3631. Jewish Writers and Rebels in German, Austrian, and American Culture. (3 cr)
Investigate literary and cultural modes of writing used by Jewish writers in Germany, Austria, and America to deal with problems of identity, anti-Semitism, and assimilation. Focus on 20th century. All readings (novels, poetry, stories) in English.

JwSt 3632W. Jewish Women in the United States. (3 cr)
Analyze of the cultural, social, economic, and religious conditions of European Jewry and American society in the 19th- and 20th-centuries that structured the lives of American Jewish women.

JwSt 3900. Topics in Jewish Studies. (3 cr [max 12 cr]; A-F only)
Historical, religious, sociological, anthropological, and humanistic study of Judaism and the Jewish people. Approach and method of study varies with topic.

JwSt 3951. Major Project. (4 cr. Prereq–JwSt major, three 3xxx JwSt courses or #)
Research project using primary and secondary sources. Students select project in consultation with a faculty member who directs the research and writing.

JwSt 5013. Biblical Law and Jewish Ethics. (3 cr. §3013, §RelA 3013, §RelA 5013)
Significance of religious law in Judaism. Babylonian background of biblical law. Biblical creation of the person as a legal category. Rabbinic transformations of biblical norms. Covenant in Christianity/Islam. Contemporary Jewish literature/philosophy.

JwSt 5111. Problems in Historiography and Representation of the Holocaust. (3 cr. Prereq–JwSt 3521 or RelS 3521 or #)
Focuses on issues connected with the Holocaust. Inclusiveness of other groups, Holocaust vs. "Shoah," historiographical conflicts about perpetrators, an examination of the problems of representation in literature and art, problems of narrative theology after Auschwitz.

JwSt 5112. Jewish Mysticism, Magic, and Kabbalah. (3 cr; A-F only)
Mystical traditions from early rabbinic traditions to Zohar (Book of Splendor) in 13th century. Literature of heavenly ascent (Hekhalot, Merkavah), Book of Creation (Sefer Yetzirah), precursors of Zohar—the Bahir. Schools of Provence, Gerona, and Zohar. Tension between legal/mystical aspects, magical theurgic techniques, evolution of doctrine of Sefirot, mystical interpretation of Scripture, erotic dimension.

JwSt 5513. Scripture and Interpretation. (3 cr; A-F only. §RelA 5513)
Idea of divine revelation, its impact upon religion/ literature. How history of Bible's creation, transmission, and interpretation help us think critically about role of idea of revelation in religious traditions. What is revelation? How does belief that a text is revealed affect the way it is read within the community for which it constitutes revelation?

JwSt 5900. Topics in Jewish Studies. (1-3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule.*

JwSt 5992. Directed Readings. (1-12 cr [max 12 cr]. Prereq–#)
Guided individual reading or study.

Journalism and Mass Communication (Jour)

School of Journalism and Mass Communication

College of Liberal Arts

Jour 1001. Introduction to Mass Communication. (3 cr; A-F only. Prereq–Open to non-jour majors)
Nature, functions, and responsibilities of communication media and agencies from professional point of view. News, opinion, entertainment, and persuasion functions, trends, communication tools, societal effects.

Jour 1905. Freshman Seminar. (3 cr; A-F only. Prereq–Fr with no more than 24 cr)
Topics specified in *Class Schedule.*

Jour 3004W. Information for Mass Communication. (3 cr; A-F only. Prereq–Jour major or jour minor or approved IDIM major or ICP major or BIS major)
Information resources for professional/academic work in mass communication. Techniques for locating, retrieving, appraising, and verifying information acquired from public records, libraries, research institutions, databases, observation, and interviews.

Jour 3006. Visual Communication. (3 cr; A-F only. Prereq–Jour major or jour minor or design comm premajor or design comm major or graphic design premajor or graphic design major or approved IDIM major or ICP major or BIS major)
Visual media, role of images in mass communication. Social, cultural, historical, psychological approaches to visual communication. Hands-on exercises for image making processes.

Jour 3007. The Media in American History and Law: Case Studies. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Case-studies approach to focus on legal and ethical issues. Media in the socioeconomic-political-technological context of a specific historical period.

Jour 3008. Mass Communication Processes and Structure. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Communication theories as they relate to mass communication processes; major structural aspects of mass communication systems as they affect mass communication processes.

Jour 3101. News Reporting and Writing. (3 cr; A-F only. Prereq–[Jour major or jour minor or approved IDIM major or ICP major or BIS major], typing skill)
Fact gathering, journalistic writing. Problems in judgment/handling of news/news features.

Jour 3102. Visual Journalism. (3 cr; A-F only. Prereq–Jour major or approved IDIM major or ICP major or BIS major)
Introduction to nonfiction storytelling in multiple visual media. Fundamentals of photojournalism, news videography, and media graphics. Conceptualizing stories, information gathering, camera work, editing, and presentation strategies for print/electronic media.

Jour 3121. Public Affairs Reporting. (3 cr; A-F only. Prereq–3004, 3101, [jour major or approved IDIM major or ICP major or BIS major])
Reporting/editing news of courts and municipal, county, state, and federal administrative/legislative agencies.

Jour 3155. Publications Editing. (3 cr; A-F only. Prereq–3004, 3101, [jour major or approved IDIM major or ICP major or BIS major])
Selection/editing of news-editorial content of newspapers, brochures, magazines, newspaper makeup, magazine format. Press association teletype service. Lecture, lab.

Jour 3173W. Magazine Writing. (3 cr; A-F only. Prereq–3004, 3101, [jour major or approved IDIM major or ICP major or BIS major])
Writing feature articles for consumer/trade publications. Market free-lance methods.

Jour 3201. Principles of Strategic Communication: Advertising. (3 cr; A-F only. Prereq–Jour major or jour minor or design comm premajor or design comm major or graphics design premajor or graphics design major or approved IDIM major or ICP major or BIS major)
Principles related to development of advertising campaigns: market analysis, positioning, creative/media strategies, evaluation. Structure of advertising industry. Economic, social, and regulatory contexts influencing advertising.

Jour 3202. Principles of Strategic Communication: Public Relations. (3 cr; A-F only. §3159. Prereq–[jour major or jour minor or approved IDIM major or ICP major or BIS major])
History/development of public relations practice/principles. Professional writing assignments in various institutional settings. Analysis/critique of public relations in contemporary society.

Jour 3241. Creative Strategy and Copywriting. (3 cr; A-F only. Prereq–3004, 3201, [jour major or approved IDIM major or ICP major or BIS major])
Advertising appeals/strategy. Advertising for print/broadcast. Individual/group projects.

Jour 3251. Strategic Communication Research. (3 cr; A-F only. Prereq–3004, [3159 or 3201 or 3202], [jour major or approved IDIM major or ICP major or BIS major])
Introduction to applied quantitative/qualitative research methods in advertising/public relations campaign development, management, and evaluation.

Jour 3279. Public Relations Writing and Campaign Tactics. (3 cr; A-F only. §3179. Prereq–[3004, [3159 or 3201 or 3202], [jour major or approved IDIM major or ICP major or BIS major]] or # for professional jour track students)
Public relations tactics. Emphasizes professional skills in writing for various audiences/purposes.

Jour 3321. Basic Media Graphics. (3 cr; A-F only. Prereq–Jour major or approved IDIM major or ICP major or BIS major)
Mass media graphics. Design principles/history, production technology, typographic legibility research, analysis of printing, production costs.

Jour 3451. Broadcast News. (3 cr; A-F only. Prereq–3004W, 3101, 3102, [jour major or approved IDIM major or ICP major or BIS major])
News writing, reporting, video photography/editing, on-air delivery. Production of weekly University newscast for cable.

Jour 3551. Economics of New Media. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Traditional/new media companies. How to think about emerging communications technologies, especially those linked to Internet. Ways to think about "information" or "content" or "media" companies and what is written about them in popular press.

Jour 3552. Internet and Global Society. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour should with adviser approval)
The Internet's promises to disadvantaged societies and its enabling of relatively privileged nations to expand in cross-national activities, including flow of mass communication. Unequal distribution of communication resources and technological divide among countries as favoring more advanced societies and thereby threatening the ability/capacity of less developed countries to be seen/heard in cyberspace.

Jour 3614. History of Media Communication. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
How people have used the tools of communication from earliest times to present. Impact of new technologies on society. Road to information superhighway.

Jour 3741. People of Color and the Mass Media. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Past/present depictions of minority individuals/groups in movies, literature, radio/TV, etc, against anthropological, psychological, and sociological knowledge/experience. Emphasizes personal/political effects of media depictions.

Jour 3745. Mass Media and Popular Culture. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Mass media's role in formation of popular culture and cultural discourse. Traditional debate over "mass culture," mass media representations, ethnicity, religion, social status, and gender. Prevalent media metaphors, caricatures, and stereotypes. Social/commercial pressures influencing media representation.

Jour 3771. Mass Media Ethics: Moral Reasoning and Case Studies. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
What it means to act "ethically." Tools to identify/analyze ethical issues. Ethical norms of print/broadcast journalism, photojournalism, public relations, and advertising.

Jour 3776. Mass Communication Law. (3 cr; A-F only. Prereq–Jour major or jour minor or approved IDIM major or ICP major or BIS major)
Brief historical background, First Amendment rights, basic law of defamation, free press and fair trial, access to news, access to the press, privacy, contempt, obscenity, regulation of broadcasting/advertising, antitrust controls, legal/ethical rules affecting journalistic practice.

Jour 3796. Mass Media and Politics. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Analysis of role of mass media in politics. Emphasizes television and electoral campaigns. News coverage vs. newsmaking. Free press in democracy.

Jour 3990. Special Topics in Mass Communication. (1-4 cr; A-F only. Prereq–Jour major or approved IDIM major or ICP major or BIS major)
Topics specified in *Class Schedule*.

Jour 3993. Directed Study. (1-3 cr [max 6 cr]; A-F only. Prereq–3004, [jour major or jour minor or approved IDIM major or ICP major or BIS major], #, ❑)
Directed study, projects.

Jour 3996. Directed Instruction. (1 cr; S-N only. Prereq–[jour major, #, ❑]; [one course for professional majors, one adviser-approved course for mass comm majors])
Internship supervised by communications organization at which student is working and by student's academic sponsor.

Jour 4131. Capstone: In-Depth Reporting. (3 cr; A-F only. Prereq–3004W, 3101, 3102, [3121 or 3173W or 3451], [jour major or approved IDIM major or ICP major or BIS major])
Advanced problems in reporting about government, politics, social problems, and the arts.

Jour 4155. Capstone: Advanced Reporting Methods. (3 cr; A-F only. Prereq–3004W, 3101, 3102, [3121 or 3173W or 3451], [jour major or approved IDIM major or ICP major or BIS major])
Investigative techniques for mass media. Quantitative research methods, use of records/documents, analysis of statistics, advanced interviewing, methods for adverse conditions.

Jour 4171. Capstone: Arts Reviewing and Reporting. (3 cr; A-F only. Prereq–[3004W, 3101, 3102, [jour major or approved IDIM major or ICP major or BIS major]] or #)
Covering the arts/entertainment beat as reviewer/reporter. Assignments follow flow of Twin Cities arts/entertainment season, including its controversies. Weekly writing assignments, readings, field trips, guest lectures from artists/arts journalists.

Jour 4174. Capstone: Magazine Editing and Production. (4 cr; A-F only. Prereq–3004W, 3101, 3102, [3155 or 3173W or 3321 or 4302], [jour major or approved IDIM major or ICP major or BIS major])
Writing, editing, illustration, design, layout, and photocomposition of multimedia. Emphasizes reporting and telling substantive stories that have implications for the public. Creating interactive experiences with audience. Developing editing skills. Students work in groups with varying specializations and create multimedia project.

Jour 4259. Cases in Strategic Planning and Thinking. (3 cr; A-F only. §4159. Prereq–3004W, [3159 or 3201 or 3202], 3251, [jour major or approved IDIM major or ICP major or BIS major])
Public relations principles applied to problems in business, government, education, and community. Practical/ethical questions. Case studies.

Jour 4261. Advertising: Media Analysis. (3 cr; A-F only. Prereq–3004W, [3159 or 3201 or 3202], 3251, [jour major or approved IDIM major or ICP major or BIS major])
Print/electronic media and their role in advertising. Selection/scheduling, rate structures/policies, evaluation/use of media/market measurements/data.

Jour 4263. Strategic Communication Campaigns. (3 cr; A-F only. Prereq–3004W, 3251, Mktg 3001, [3179 or 3241 or 3279 or 4159 or 4259 or 4261], [jour major or approved IDIM major or ICP major or BIS major])
Developing campaign strategy/tactics. Emphasizes planning/decision-making skills.

Jour 4272. Interactive Advertising. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
The Internet and other interactive forms of advertising. Defining interactivity. Interactive advertising models and how they differ from

traditional ad models. Issues related to creating, measuring, pricing, and targeting interactive ads. Interactive ads in global, legal, and ethical contexts.

Jour 4274. Advertising in Society. (3 cr; A-F only. Prereq–Jour major or jour minor or approved IDIM major or ICP major or BIS major)
Economic, social, and cultural influences of advertising. Forms of regulation: self-regulation and governmental. Critique of advertising's role in society. Exploration of current issues (e.g., stereotyping, political advertising, advertising to children). Ethics in advertising.

Jour 4302. Electronic Photojournalism. (3 cr; A-F only. Prereq–3004W, 3102, [jour major or approved IDIM major or ICP major or BIS major])
Practice of photojournalism in contemporary digital environment. Components of visual storytelling: conceptualizing/planning photo shoots, photo stories, essays; researching story ideas; gaining access to subjects; shooting strategies; structuring/presenting visual narratives in print, on Internet. Scanning techniques, digital darkroom processing with Photoshop. Optimizing images for print/Web outputs. Professional/ethical issues.

Jour 4321. Publication Graphics. (3 cr; A-F only. Prereq–3004, 3321, [jour major or IDIM major or ICP major or BIS major])
Design process applied to production of magazines, brochures, newsletters. Computer as tool to prepare electronic documents for printing.

Jour 4441. Capstone: Documentary Production. (3 cr; A-F only. Prereq–3004, 3101, 3102, [jour major or approved IDIM major or ICP major or BIS major], #)
Types of "long form" news, reality-based production for cinema/TV. Preparing broadcast-quality documentary using non-linear editing techniques. Students work in teams. Lecture, lab.

Jour 4442. Capstone: Advanced Television News. (3 cr; A-F only. Prereq–3004W, 3101, 3102, 3451, [jour major or approved IDIM major or ICP major or BIS major])
Preparation/delivery of television newscasts. Industry problems, legal/ethical considerations, social impact of electronic journalism. Lecture, lab, news production.

Jour 4551. New Media Culture. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Impact of "new media" (all forms of internet communication, wireless media, and combinations of "old" and "new" media) on current/future cultures. How new media may change ways we communicate, distribute, and process information. Social impact.

Jour 4552. Law of Internet Communications. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Whether/how/which traditional media laws/regulations apply to Internet. Developing law of communication on Internet, global/ethical issues.

Jour 4615. History of Visual Communication in Mass Media. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Social history of photography, film, video. Informational, documentary, propaganda, and entertainment functions of visual communication. Rise/influence of visual media industries and of public-image making.

Jour 4721. Mass Media and U.S. Society. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Economic, political, social determinants of character/content of mass communications in America. Effect, structure, functioning of mass media. Problems, prospects, criticism. Professionalism, technology, reform.

Jour 4731H. Honors: Communications Problems and Issues. (3 cr; A-F only. Prereq–[Jour major or jour minor or approved IDIM major or ICP major or BIS major], honors)
Individual project. Seminar.

Jour 4801. Global Communication. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or pre-jour with adviser approval)
Structures, processes, consequences of international mass communication. Problems in free flow of information. Roles of international organizations. Mass communication in social, political, economic development. Implications for conflict resolution.

Jour 4990. Special Topics in Mass Communication. (1-4 cr [max 1 cr]; A-F only. Prereq–Jour major or approved IDIM major or ICP major or BIS major)
Topics specified in *Class Schedule*.

Jour 4993H. Honors: Directed Study. (1-3 cr [max 6 cr]; A-F only. Prereq–3004, [jour major or jour minor or approved IDIM major or ICP major or BIS major], honors div regis, ❑, #)
Independent study/projects.

Jour 5101. Advanced News Writing and Reporting. (3 cr; A-F only. Prereq–Enrollment in MA in health journalism or #)
Techniques of newspaper reporting and writing. Hands-on approach. What makes news. Basics of AP style. Thinking critically. Generating story ideas. Interviewing sources. Writing news stories and features. Exercises, discussion.

Jour 5251. Psychology of Advertising. (3 cr; A-F only. Prereq–Jour major or jour minor or design comm premajor or design comm major or graphic design premajor or graphic design major or IDIM major or ICP major or BIS major; Psy 1001 recommended)
Psychological principles, research techniques, and applications in advertising/selling. Consumer attitudes/behavior. Psychological mechanisms upon which effectiveness of advertisements/commercials depends.

Jour 5316. Theories of Visual Communication. (3 cr; A-F only. Prereq–[3006, [jour major or jour minor or IDIM major or ICP major or BIS major]] or #)
Perspectives on study/analysis of visual communication. Message structure, systems of production, use of visual media. Contributions from sociology, anthropology, psychology, and history.

Jour 5501. Communication and Public Opinion. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or prejour with adviser approval)
Theories of communication, persuasion, attitude change. Functions of interpersonal/mediated communication in diffusion of information and in opinion formation.

Jour 5541. Mass Communication and Public Health. (2 cr; A-F only. Prereq–Jour major or jour minor or grad major or IDIM major or ICP major or BIS major)
Role, function, effect of mass media on public health. Planned/unplanned effects. Review/analysis of literature on how theories, models, assumptions of mass communication research relate to public health.

Jour 5601W. History of Journalism. (3 cr; A-F only. Prereq–Jour major or jour minor or IDIM major or ICP major or BIS major)
Development of American newspapers/periodicals from beginnings in Europe to present day. Rise of radio/television. Relation of communications development to political, economic, social trends.

Jour 5606W. Literary Aspects of Journalism. (3 cr; A-F only. Prereq–Jour major or jour minor or IDIM major or ICP major or BIS major)
Literary aspects of journalism as exemplified in, and influenced by, works of English/American writers past/present. Lectures, discussions, weekly papers.

Jour 5725. Management of Media Organizations. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or prejour with adviser approval)
Introduction to concepts/principles of media management. Strategic planning, leadership, organizational strategies, ethical/legal issues. Working in teams. Balance sheets, income statements. Motivating/promoting people.

Jour 5771. Media Ethics: Principles and Practice. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or prejour with adviser approval)
What it means to act "ethically." Tools to identify/analyze ethical issues. Ethical norms of print/broadcast journalism, photojournalism, public relations, and advertising.

Jour 5777. Contemporary Problems in Freedom of Speech and Press. (3 cr; A-F only. Prereq–Jour major or jour minor or IDIM major or ICP major or BIS major)
Legal/constitutional derivation of freedom of speech/press. Emphasizes case law, judicial theories, doctrines, tests, and values. Symbolic, commercial, compelled speech, speech plus, petition/assembly, leading press cases, legal research techniques.

Jour 5825. World Communication Systems. (3 cr; A-F only. Prereq–Non-jour major or jour major with course appr on prog plan or prejour with adviser approval)
Mass media systems of world, described/analyzed regionally/nationally. Historical roots. Social, economic, cultural context. Contemporary conditions/prospects. Relevance of journalism/mass communication to international affairs.

Jour 5990. Special Topics in Mass Communication. (1-4 cr; A-F only. Prereq–Jour major or approved IDIM major or ICP major or BIS major)
Topics specified in *Class Schedule*.

Jour 5993. Directed Study. (1-3 cr; A-F only. Prereq–3004, [jour major or jour minor or approved IDIM major or ICP major or BIS major], GPA of at least 3.00, ❑, #)
Directed study/projects.

Kinesiology (Kin)

School of Kinesiology

College of Education and Human Development

Kin 1050. Beginning Military Physical Fitness Training. (1 cr [max 4 cr]; A-F only)
The Army's model of physical fitness training is used to address five aspects of fitness in the context of running, weight training, strength exercise, circuit training, and team sport activities. Students are organized into groups of similar fitness levels.

Kin 1375. Play Behavior. (3 cr)
Overview of play behavior across species, cultures, social settings. Relationship of play between physical/psychological development, role of sports/games in play, design of toys/playgrounds.

Kin 1871. Introduction to Kinesiology. (2 cr; A-F only)
Examination of the professional and disciplinary dimensions of physical activity. Representative experiences include lecture, discussion, small group activities, and laboratory tours.

Kin 1989. Health and Society. (3 cr; A-F only. §1999)
Major factors influencing human health, including behavior, the physical and social environments, policy, and economics. Opportunities for citizen participation in addressing each factor are explored, focusing on health topics such as nutrition and violence.

Kin 1993. Directed Study in Kinesiology. (1-6 cr; A-F only. Prereq–#)
For lower division students planning to major in kinesiology who wish to study a topic or problem under tutorial guidance.

Kin 3001. Lifetime Fitness and Health. (3 cr; A-F only)
Overview of fitness/health as function of disease risk, nutrition, stress management, weight control, exercise, illicit drugs, nutraceuticals, and well-being. Base of action/knowledge needed for surviving school, maximizing performance, and living a healthy life.

Kin 3027. Human Anatomy for Kinesiology Students. (3 cr; A-F only)
Introduction to human anatomy. Emphasizes musculoskeletal anatomy germane to athletic training, biomechanics, exercise physiology, motor learning/development.

Kin 3050. Advanced Military Physical Fitness Training. (1 cr [max 4 cr]; A-F only. Prereq–4 cr of 1050 or #)
Students take on leadership roles in implementing Army's model of physical fitness training. Model addresses five aspects of fitness in the context of running, weight training, strength exercise, circuit training, and team sport activities.

Kin 3111. Human Anatomy. (2 cr; A-F only. §3110)
Beginning anatomy course for nonkinesiology students pursuing coaching licensure or for nonprofessional students interested in an exercise science approach to anatomy. Focus on a regional approach to muscle, nerve, and circulatory anatomy of the limbs and trunk and a systematic anatomy approach for circulatory, respiratory, digestive, urinary, and nervous systems. Students are encouraged to voluntarily attend arranged demonstrations of human cadaver dissections.

Kin 3112. Introduction to Biomechanics. (3 cr; A-F only. Prereq–[[3027 or 3111 or CBN 1027], Phys 1101W, CEHD student] or #)
Mechanical principles applied to human movement. Analytical methods of examining human motion. Quantitative/qualitative approaches.

Kin 3113. First Responder for Coaches and Athletic Trainers. (3 cr; A-F only. §3112 [quarter version])
Emergency medicine for coaches/athletic trainers. Patient assessment, airway management, CPR, splinting, spinal immobilization. Emphasizes critical thinking skills in emergency settings. Certifications: AHA-BLS, First Responder. Taught by a multidisciplinary faculty of health care professionals.

Kin 3114. Prevention and Care of Athletic Injuries. (3 cr; A-F only. Prereq–[[3027 or 3111 or CBN 1027], CEHD student] or #)
Principles in athletic training for prevention/care of injury. Taping/bracing techniques. Lab.

Kin 3126W. Psychology and Sociology of Sport. (3 cr; A-F only. Prereq–Kin majors)
Introduction to sport psychology and sport sociology. Topics include factors related to individual and institutional behavior in the following physical activity settings: competitive and recreational athletics, exercise, physical education, and rehabilitative.

Kin 3131W. History and Philosophy of Sport. (3 cr; A-F only. Prereq–Kin majors or #)
Introductory description and interpretation of the historical and philosophical development of physical education and sport from primitive societies to 20th century civilization.

Kin 3133. Motor Control, Learning, and Development. (3 cr; A-F only. §3132, §3135. Prereq–Kin major or #)
Concepts and principles of the coordination and control of movement, the learning of movement skills, and the changes in movement performance and physical growth across the life span.

Kin 3143. Organization and Management of Sport. (3 cr; A-F only. Prereq–Kin major or #)
Principles, policies, and procedures involved in the administration and management of sports programs at the interscholastic and intercollegiate levels.

Kin 3151. Measurement, Evaluation, and Research in Kinesiology. (3 cr; A-F only. §3150. Prereq–Kin major or #)
Introduction to the philosophy of evaluation and measurement in physical education and exercise science. Test selection, construction, evaluation, and administration. Basic research methods, statistical analysis, and interpretation of test scores.

Kin 3168. Soccer Coaching. (1 cr. §Kin 3371)
Fundamental approaches used in the science of coaching soccer. Emphasis on teaching and coaching of technique, team organization and management, development of training schedules, and rules and strategies related to the game.

Kin 3169. Volleyball Coaching. (1 cr. Prereq–Good understanding of volleyball)
Motivation, team building, communication, game strategies, philosophy. Lecture, discussion, practical application.

Kin 3171. Baseball Coaching. (1 cr)
Safety, rules, team building, game strategies, and philosophy. Students should have a good understanding of the sport before enrolling. Lecture, discussion, and practical application.

Kin 3172. Basketball Coaching. (1 cr)
Teaching and coaching individual and team skills of the game; rules and strategies.

Kin 3173. Football Coaching. (1 cr)
Responsibilities and philosophies of coaching, team management, skill development and analysis, rules, systems of play, psychology, and scouting.

Kin 3174. Golf Coaching. (1 cr)
Safety, rules, etiquette, skill development and analysis, and philosophy. Students should have a good understanding of the sport before enrolling. Lecture, discussion, and practical application.

Kin 3175. Gymnastics Coaching. (1 cr)
Coaching gymnastics for males and females. Skill progression, skill analysis and spotting, routine construction, safety, training for competition, scoring and rules, psychology, off-season conditioning, and responsibilities of the coach.

Kin 3176. Ice Hockey Coaching. (1 cr)
Coaching hockey for males and females. Terminology, breakouts, penalty killing, power-plays, neutral ice play, offensive forechecking, defensive strategies, comparisons of men's and women's techniques.

Kin 3177. Swimming and Diving Coaching. (1 cr)
Coaching swimming for males and females. Stroke mechanics, starts and turns, safety, training for competition, psychology, off-season conditioning, roles and responsibilities of the coach.

Kin 3178. Tennis Coaching. (1 cr)
Coaching strategies, safety and rules, training for competition, off-season training and conditioning, roles and responsibilities of the coach.

Kin 3179. Track and Field Coaching. (1 cr)
Basic training and conditioning programs, event characteristics, coaching strategies, knowledge of track and field, meet administration.

Kin 3181. Wrestling Coaching. (1 cr)
Teaching and coaching of technique, team organization and management, rules interpretation, and development of training schedules.

Kin 3327. Teaching Physical Education in the Elementary School. (2 cr; A-F only. Prereq–Elem ed major)
Overview of the elementary physical education process with focus on a classroom teacher's perspective and needs. Representative experiences include participation, lecture, micro-teaching, final test.

Kin 3385. Human Physiology for Kinesiology Students. (3 cr; A-F only. Prereq–[[3027 or CBN 1027 or equiv], kin major] or #)
Tissue/organ function, cell structure, cellular enzymes, energy production, chemical composition of the body. Nervous, muscular, endocrine, circulatory, renal, respiratory, and gastrointestinal physiological control systems studied in detail. Clinical, exercise, sport, work examples.

Kin 3505. Introduction to Human-Centered Design. (3 cr. §5505)
Application of design to meet human needs. Design of fabricated products, tools/machines, software/hardware interfaces, art/culture, living environments, and complex sociotechnical systems.

Kin 3696. Supervised Practical Experience. (1-10 cr [max 10 cr]; S-N only. §3625. Prereq–Kin major, #)
On-the-job supervised practical experience in the fields of sport and exercise under a specialist in a particular area of study or emphasis.

Kin 3993. Directed Study in Kinesiology. (1-10 cr [max 10 cr]; A-F only. Prereq–#)
Student-selected clinical or research experience.

Kin 4385. Exercise Physiology. (4 cr; A-F only. Prereq–3385 or equiv, kin major or #)
Effects of exercise on physiological systems of the human body including energy and nutritional requirements of exercise, exercise prescription, and athletic conditioning, ergogenic aids, exercise in environmental extremes, and gender and heritability factors related to adaptation to training.

Kin 5001. Foundations of Human Factors/Ergonomics. (3 cr; A-F only)
Variability in human performance as influenced by interaction with designs of machines and tools, computers and software, complex technological systems, jobs and working conditions, organizations, and sociotechnical institutions. Emphasizes conceptual, empirical, practical aspects of human factors/ergonomic science.

Kin 5103. Developmental/Adapted Physical Education. (3 cr; A-F only)
Introduction to physical education for students with disabilities, emphasizing conceptual, organizational, and administrative issues. Topics include historical and legal foundations, service components, individualized education plans, professional roles, and assessment of movement skills.

Kin 5104. Physical Activities for Persons with Disabilities. (3 cr; A-F only)
Different approaches to providing physical education service and related movement interventions for persons with disabilities. Topics: movement behavior foundations, movement skill progressions, unique considerations for specific impairments, and sport for persons with disabilities

Kin 5106. Adapted Aquatics. (2 cr. Prereq–If certification as Adapted Aquatic Instructor desired, then current American Red Cross Water Safety Instructor or equivalent YMCA certification is required)
Introduction to adapted aquatics for students in kinesiology and leisure studies, physical therapy, and those interested in working with people with disabilities. Topics: teaching approaches, programming, accommodations/adaptations, assessments, individualized plans. Activities: pool sessions with/without clients, groups, site observations.

Kin 5111. Sports Facilities. (3 cr; A-F only. §Rec 5111. Prereq–Kin or rec grad student or MEd student)
Steps in planning/building facilities for athletics, physical education, and sport for college, professional, and public use.

Kin 5115. Event Management in Sport. (3 cr; A-F only. Prereq–Grad student, #)
Techniques/principles of planning, funding, and managing sport events. Collegiate championships, non-profit events, benefits, professional events.

Kin 5121. Application of Basic Sciences to Kinesiology. (3 cr; A-F only)
Examination of how knowledge from the basics of science can lead to differing perspectives from which to approach questions directed to kinesiological inquiry.

Kin 5122. Applied Exercise Physiology. (3 cr; A-F only. Prereq–4385 or equiv or #)
Mechanisms of cardiorespiratory and muscular responses to exercise; application of exercise physiology to assessment of work capacity, athletic conditioning, and requirements of human powered vehicles; low to moderate exercise as an intervention in lowering risk for common health problems.

Kin 5124. Human Factors Physiology. (3 cr; A-F only. Prereq–#)
In-depth view of the concepts, problems, and issues associated with ergonomic applications to improving the design and operation of human work spaces.

Kin 5126. Sport Psychology. (3 cr. Prereq–3126 or equiv or #)
Theory and research in sport psychology. Focus on the psychological study of human behavior in sport and physical activity settings.

Kin 5132. Motor Development. (3 cr; A-F only. Prereq–3133 or #)
Developmental aspects of human movement behavior/learning. Life span change of motor skills.

Kin 5135. Motor Control and Learning. (3 cr. Prereq–3133 or #)
Main theoretical ideas/research that have advanced motor control/learning over last three decades.

Kin 5136. Psychology of Coaching. (3 cr)
Psychological dimensions of coaching across age levels, including coaching philosophy, leadership, communication skills, motivation, and mental skills training for performance enhancement.

Kin 5141. Nutrition for Health and Physical Performance. (3 cr; A-F only. Prereq–FScN 1112 or equiv)
Requirements and physiologic roles of nutrients and physical activity in promotion of health/performance. Assessment of energy requirements. RDAs, food composition/safety, weight management. Prevention of chronic diseases; emphasizes coronary heart disease.

Kin 5152. Curriculum Development in Physical Education. (2 cr; A-F only. Prereq–Init lic/MEd phys ed student)
Trends, issues, and challenges in early childhood/K-12 physical education. Potential effect on curriculum.

Kin 5171. Foundations of Kinesiology. (3 cr; A-F only. Prereq–Kin major or #)
Introduction to the emerging field of kinesiology, broadly conceived as the study of human movement. Development and emergence of the term kinesiology and the scholarly, political, and educational ramifications of its development.

Kin 5196. Practicum: Developmental/Adapted Physical Education. (1-4 cr [max 4 cr]; S-N only. Prereq–5103 or equiv or #)
Observation of, participation in physical education instruction for students with disabilities. Current issues in developmental/adapted physical education. Exchange of ideas/problems.

Kin 5235. Advanced Biomechanics II: Kinetics. (3 cr; A-F only. Prereq–[3112 or equiv], PMed 5135, undergrad college physics, intro calculus,)
Kinetic aspects of human movement (single/multi-joint torques, simple inverted pendulum models, mass-spring systems). Analysis of experimental data and of computer simulations. Lectures, seminars, lab.

Kin 5328. International and Comparative Sport and Physical Education: The Olympic Games. (3 cr; A-F only. Prereq–Grad or #)
Explores the role the Olympic Games has played and continues to play in the global village. Advanced insight into the substance, nature, and significance of sport to nation building and the international and comparative sociocultural process.

Kin 5365. Health Promotion Program Design and Implementation. (3 cr; A-F only. Prereq–3001)
Study of behavioral change methodology and theory related to nutrition, weight control, exercise, stress management, healthy lifestyles, and lifetime health. Application of these concepts in health promotion settings including work sites, managed care organizations, clinics, fitness centers, and educational institutes.

Kin 5371. Sociology of Sport. (3 cr; A-F only. Prereq–3126, grad or #)
A study of sport, sporting processes, social influences, systems, and structures that have effected and exist within, and among societies, nations, and cultures. Exploration of contemporary issues concerning social differentiation and social concerns such as violence and honesty.

Kin 5375. Competitive Sport for Children and Youth. (3 cr)
Cognitive, behavioral, and biological factors having important implications for competitive sport participants from early childhood through high school age. Emphasis on translating sport science research into practical implications for youth sport coaches, teachers, and administrators.

Kin 5385. Exercise for Special Populations. (2 cr; A-F only. Prereq–undergrad physiology or biology)
Exercise testing and prescription with modifications required because of special considerations associated with aging, gender differences, environmental conditions, and the presence of medical conditions.

Kin 5421. Sport Finance. (3 cr; A-F only. Prereq–Grad student, #)
Introduction to financial analysis in sport. Cash flow statements, budgeting issues, traditional/innovative revenue producing strategies available to sport organizations. Discussion, practical analysis of current market.

Kin 5435. Advanced Theory and Techniques of Exercise Science. (3 cr; A-F only. Prereq–[3385, 4385, kin major] or #)
Theoretical constructs, in-depth description of procedures used in exercise science research and clinical settings. Laboratory exercises, lectures.

Kin 5461. Foundations of Sport Management. (3 cr; A-F only. Prereq–[Kin or rec] student or #)
Theories/techniques in administration/management of sport enterprises. Organizational theory/policy, practical examples of sport management skills/strategies.

Kin 5485. Electrocardiogram, Graded Exercise Testing, and Prescription. (3 cr; A-F only. Prereq–[3385, 4385] or #)
Introduction to electrocardiogram. Placement/interpretation, use in clinical exercise testing and exercise prescription. Hands-on experience in electrocardiogram for exercise testing.

Kin 5505. Human-Centered Design: Principles and Applications. (3 cr. §3505)
Application of design to meet human needs. Design of fabricated products, tools/machines, software/hardware interfaces, art/culture, living environments, and complex sociotechnical systems.

Kin 5511. Women in Sport and Leisure. (3 cr; A-F only. §Rec 5511)
Critically examines women's involvement in/contributions to sport, physical activity, and leisure.

Kin 5601. Ethics in Sport Management. (2 cr; A-F only. Prereq–Grad student, #)
How we develop morally. Sport and perpetuation of violence in society. Moral reasoning. Moral/ethical conduct in sport. Issues explored from historical, philosophical, and sociological perspectives. Critical reading, writing, discussion.

Kin 5621. Advanced Athletic Training: Evaluation of Athletic Injury. (3 cr; A-F only. Prereq–3114, [3027 or CBN 1027])
Theory, principles, techniques to recognize/evaluate athletic injury to all major body parts.

Kin 5622. Therapeutic Modalities in Athletic Training. (3 cr; A-F only. Prereq–3114)
Theoretically based guide for the use of therapeutic modalities for the management of athletic injuries in a practical setting.

Kin 5631. Programming and Promotion in Sport. (3 cr; A-F only. Prereq–Grad student, #)
Introduction to marketing concepts as they apply to sport industry. Consumer behavior, market research, marketing mix, corporate sponsorship, licensing. Discussion, practical application.

Kin 5696. Practicum in Kinesiology. (1-6 cr [max 6 cr]; S-N only. Prereq–Grad student in kin, #)
Practical experience in kinesiology under supervision of a University adviser and an agency supervisor.

Kin 5697. Student Teaching: Coaching. (1-10 cr [max 10 cr]; S-N only. Prereq–Admited to coaching program, #)
Student coaching experience under supervision of a mentor coach.

Kin 5720. Special Topics in Kinesiology. (1-8 cr [max 9 cr]. Prereq–Upper div undergrad or grad student in kin or #)
Current issues in the broad field and subfields in kinesiology, or related coursework in areas not normally available through regular offerings.

Kin 5722. Human Factors Psychology. (3 cr; A-F only. Prereq–Grad student or #)
Psychological principles that underlie human interactions with technological systems. Techniques/methodologies to assess faulty/incorrect system design. Emphasizes human-centered approaches. Rigorous evaluation of human-machine interaction.

Kin 5723. Psychology of Sport Injury. (3 cr. Prereq–Intro psych course)
Psychosocial bases of risk factors preceding sport injury, responses to the occurrence of sport injury, and the rehabilitation process. Lecture, discussion, guest lecture, interviews, and presentation experience.

Kin 5725. Organization and Management of Physical Education and Sport. (3 cr; A-F only. Prereq–Grad/init lic or #)
Comprehensive analysis of organization and management of physical education and sport in educational settings. Focus on management and planning processes, management skills, functions, roles, decision making, leadership, shared systems, and organizational motivation. For physical education teachers, coaches, community sport administrators.

Kin 5726. Physical Education—Teaming and Trekking. (2 cr; A-F only. Prereq–Kin major, MEd student, or #)
Development of cooperative and team-building activities, group planning, and leadership skills in preparation for a two-day trip in a state park using practiced outdoor skills of camping, canoeing, and backpacking. Must be comfortable in water.

Kin 5727. Physical Education—An Adventure Experience. (1 cr; A-F only. Prereq–Kin major, MEd student, or #)
Group and individual initiatives in an experientially based program emphasizing participation in leadership, group cooperation, problem solving, low ropes, climbing walls, sensible risk taking, and trust-oriented activities.

Kin 5740. Topics: Coaching of Individual, Dual, or Team Sports. (1-9 cr [max 9 cr]; A-F only. Prereq–PEL)
Instruction at the advanced level, including analyses of skills, game strategies, specific techniques of coaching, and methods of training and conditioning.

Kin 5801. Legal Aspects of Sport and Recreation. (4 cr; A-F only. §Rec 5801. Prereq–Kin or rec major)
Legal issues related to recreation, park, and sport programs/facilities in public/private sectors.

Kin 5941. Neural Basis of Movement. (3 cr; A-F only. Prereq–[[3111, CBN 1027] or equiv], [Phsl 3051 or equiv])
Overview of various neural subsystems involved in controlling human/primate sensorimotor behavior. Effects of brain lesions on overt behavior, possibilities for rehabilitation. Systems theory approach. Lectures, seminars, class presentations.

Kin 5981. Research Methodology in Kinesiology and Leisure Studies. (3 cr; A-F only. §Rec 5981. Prereq–3151 or equiv)
Defines/reviews various types of research in exercise/sport science, physical education, and recreation studies. Qualitative research, field studies, and methods of introspection as alternative research strategies to traditional scientific paradigm.

Kin 5992. Readings in Kinesiology. (1-9 cr [max 9 cr]; A-F only. Prereq–CEHD student, grad, #)
Independent study under tutorial guidance.

Kin 5995. Research Problems in Kinesiology or Physical Education. (1-6 cr [max 6 cr]; A-F only. Prereq–Grad student or MEd student in kin or #)
Focus on selected topics in physical activity/human performance.

Korean (Kor)

Department of Asian Languages and Literatures
College of Liberal Arts

Kor 1011. Beginning Korean. (5 cr)
Basic grammatical structure, vocabulary, and expressions of modern colloquial Korean. Introduces Korean writing system.

Kor 1012. Beginning Korean. (5 cr. Prereq–1011)
Basic grammatical structure, vocabulary, and expressions of modern colloquial Korean.

Kor 3021. Intermediate Korean. (5 cr. Prereq–1012)
Speaking, reading, and writing at intermediate level in modern colloquial Korean. Simple narration/written reports. Some basic Chinese characters may be introduced.

Kor 3022. Intermediate Korean. (5 cr. Prereq–3021)
Speaking, reading, and writing at intermediate level in modern colloquial Korean. Narration/written reports. Introduction of additional basic Chinese characters.

Kor 3031. Third Year Korean. (4 cr. Prereq–3022)
Speaking, reading, and writing at advanced level in modern colloquial Korean. Narration, written reports. Further Chinese characters introduced.

Kor 3032. Third Year Korean. (4 cr. Prereq–3031)
Speaking, reading, writing at advanced level in modern colloquial Korean. Narration, written reports. Further Chinese characters introduced.

Kor 3650. 20th Century Korean Literature in Translation. (3 cr)
Various works of Korean literature from colonial age through 1990s. Literary responses to historical changes. Relationship of literary works with historical issues such as colonial experience, Korean civil war and its results, and modern industrial society.

Kor 3900. Topics in Korean Literature. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule*.

Kor 3920. Topics in Korean Culture. (1-4 cr [max 12 cr])
Topics specified in *Class Schedule*.

Laboratory Medicine and Pathology (LaMP)

Department of Laboratory Medicine and Pathology

Medical School

LaMP 4172. Pathology for Allied Health Students. (3 cr. Prereq–Regis allied health program, anatomy course, physiology course or #)
General and organ system pathology.

LaMP 4177. Pathology for Allied Health Students. (3 cr. Prereq–Regis allied health program, anatomy course, physiology course or #)
General and organ system pathology.

LaMP 5125. Chronobiology. (2-6 cr; A-F only)
How to interpret biologic time series and how to use them in practice as well as in designing chronobiology experiments. Chronobiologic procedures of data collection and analysis, interpretation of the output in clinical practice. Anatomic pathology experience.

Landscape Architecture (LA)

Department of Landscape Architecture

College of Architecture and Landscape Architecture

LA 1101W. Introduction to Design Thinking. (4 cr; A-F only)
Introduction to theories and processes that underpin design thinking. Survey of the design professions; the power of design; and interactions between humans and their natural, social, and designed environments.

LA 1201. Learning from the Landscape. (3 cr; A-F only)
Physical elements shaping the world. Shapes, forms, and order of towns, cities, and countryside. How design, planning, and natural systems, taken together, shape physical surroundings. Lectures, discussions, field trips.

LA 1301. Introduction to Drawing in Architecture and Landscape Architecture. (3 cr; A-F only)
Development of basic skills involved in perceiving and representing the material environment. Study of sketching and drawing conventions of visual phenomena and forms.

LA 1401. The Designed Environment. (3 cr; A-F only)
Examination of relationships between place and space, and realms of the ideal and real, public and private. Survey of how the fields of architecture, landscape architecture, and urban design have explored those issues.

LA 3001. Introduction to Landscape Architectural Design. (3 cr; A-F only. Prereq–B.E.D. major or #)
Introduction to spatial design issues at all scales.

LA 3204. Landscape Ecology. (3 cr; A-F only)
Relationships among spatial patterns, temporal patterns, and ecological processes in landscape.

LA 3413. Introduction to Landscape Architectural History. (3 cr [max 3 cr]; A-F only. Prereq–One course in history at 1xxx or higher)
Study of landscape architecture's roots by examining the creation of landscapes over time. Areas of emphasis include ecological and environmental issues; and the political, economic, and social contexts of landscape architectural works.

LA 3501. Environmental Design and Its Biological and Physical Context. (3 cr; A-F only)
Consideration of dynamic relationships between environmentally designed places and their biological and physical contexts. Case studies of successfully integrating created place and biological and physical contexts.

LA 3571. Landscape Construction: Site Systems and Engineering. (3 cr; A-F only. Prereq–B.E.D. major or B.E.D. minor or #)
Theory applications of landform systems for design. Landform typology, representation methods, manipulation techniques, use of land survey data, earthwork construction issues. Spatial accommodation of vehicles in landscape architecture, including road design.

LA 5201. Making Landscape Spaces and Types. (6 cr; A-F only. Prereq–B.E.D. accelerated status or LA grad or #)
Design exploration using 3-D models and historical precedent studies to create outdoor spaces for human habitation and use. Application of the basic landscape palette of landform, plants, and structures to give physical, emotional, cognitive, and social definition to created places.

LA 5202. Landscape Analysis Workshop. (1 cr; S-N only)
Introduction to field techniques for site analysis, including vegetation, soil, and landform description. One-week session, before fall term, at lake Itasca Forestry and Biological Station.

LA 5203. Ecological Dimensions of Space Making. (6 cr; A-F only. Prereq–LA major or #; recommended for both B.E.D. and grad students)
Design studio experience drawing on ecological, cultural, aesthetic influences to explore development of design ideas responsive to ecological issues and human experience.

LA 5301. Introduction to Drawing in Architecture and Landscape Architecture. (3 cr; A-F only. §1301. Prereq–LA grad student, accelerated B.E.D. student)
Perceiving/representing material environment. Sketching/drawing conventions, visual phenomena/forms.

LA 5351. AutoCAD I. (3 cr; A-F only. Prereq–B.E.D. major or LA grad or #; may not be taken for graduate credit)
Basic concepts, tools, and techniques of computer-aided drawing. Introduction to current AutoCAD Release software. Strategies and techniques for producing dimensioned and annotated drawings. Introduction to 3-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus.

LA 5352. AutoCAD II. (3 cr; A-F only. Prereq–Arch 5351 or LA 5351, B.E.D. major or LA grad or #; may not be taken for graduate credit)
Intermediate concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release software. Strategies and techniques for producing dimensioned and annotated drawing. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus.

LA 5371. Computer Methods I. (1 cr. Prereq–B.E.D. accelerated status or LA grad or #)
Introduction to current techniques, programs, and new editions of computer programs, and their application to landscape architecture computing.

LA 5372. Computer Methods II. (1 cr. Prereq–Arch/LA 5371, LA grad or #)
Current techniques and computer programs, and their application to landscape architecture computing.

LA 5373. Computer Methods III. (3 cr. Prereq–Arch/LA 5372, LA grad or #)
Advanced techniques and computer programs, and their application to landscape architecture computing in design, theory, and technology.

LA 5400. Topics in Landscape Architecture. (1-3 cr [max 12 cr]; A-F only. Prereq–B.E.D. accelerated status or LA grad or #)
Current topics in landscape architecture. Taught by regular or visiting faculty in their areas of specialization.

LA 5401. Directed Studies in Emerging Areas of Landscape Architecture. (1-6 cr [max 12 cr]. Prereq–B.E.D. accelerated status or LA grad or #)
Independent studies under the direction of landscape architecture faculty.

LA 5402. Directed Studies in Landscape Architecture History and Theory. (1-6 cr [max 12 cr]; A-F only. Prereq–B.E.D. accelerated status or LA grad or #)
Independent studies under the direction of landscape architecture faculty.

LA 5403. Directed Studies in Landscape Architecture Technology. (1-6 cr [max 12 cr]; A-F only. Prereq–B.E.D. accelerated status or LA grad or #)
Independent studies under the direction of landscape architecture faculty.

LA 5404. Directed Studies in Landscape Architecture Design. (1-6 cr [max 12 cr]; A-F only. Prereq–B.E.D. accelerated status or LA grad or #)
Independent studies under the direction of landscape architecture faculty.

LA 5405. Interdisciplinary Studies in Landscape Architecture. (1-6 cr [max 12 cr]; A-F only. Prereq–B.E.D. accelerated status or LA grad or #)
Research, planning, and/or design projects. Topics vary.

LA 5413. Introduction to Landscape Architectural History. (3 cr [max 3 cr]; A-F only. Prereq–One course in history at 1xxx or higher)
Introductory course examines the multiple roots of landscape architecture by examining the making of types of landscapes over time. Emphasis on ecological and environmental issues, and issues related to political, economic, and social contexts of landscape architectural works.

LA 5431. History of Landscape Architecture: Individual Influences. (3 cr; A-F only)
Assessment of influences of individuals on formation of the profession of landscape architecture from 1800 to present. Lectures, presentations, field trips, readings, papers, projects.

LA 5571. Landscape Construction: Landform Systems and Spatial Performance. (3 cr; A-F only. Prereq–Accelerated BED student or LA grad student)
Theory and professional applications of landform systems for design. Landform typology, representation methods, manipulation techniques, use of land survey data, earthwork construction issues. Spatial accommodation of vehicles in landscape architecture, including road design.

LA 5572. Plants in Design. (3 cr; A-F only. Prereq–[5201, 5203, plant identification course] or #)
Design principles for using plants in landscape. Cultural/ecological principles in design projects of various scales. Lectures, presentations, field trips, readings, projects.

LA 5573. Landscape Technology: Introduction to Geographic Information Systems. (3 cr; A-F only. Prereq–Jr or sr B.E.D. major or LA grad or #)
GIS as an analytical tool to solve geographical problems of regional landscape design and resource management. Topics include application techniques, analytical procedures, data characteristics, data sources, input/output methods, and implementation.

LA 5574. Identification of Minnesota Flora. (3 cr; A-F only. Prereq–BED accelerated status or LA grad student or #)
Introduction to identification of approximately 500 plants commonly used by landscape architects and environmental designers in Minnesota. Students develop a working knowledge of over 250 plants. Focuses on plant selection techniques, plant landscape associations, and issues of plants for use in standard landscape architectural settings. Regular field sessions.

Language, Teaching, and Technology (LgTT)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

LgTT 5101. Applications of Technology in Language Teaching. (3 cr)
Explore uses of technology in language teaching; theoretical background, demonstrations, and applications.

LgTT 5110. Technology in the Second Language Classroom. (2 cr. §5611)
Examine, evaluate, and use technology in language teaching. Theoretical background, demonstration, hands-on exploration.

LgTT 5611. Technology in Second Language Instruction. (3 cr. Prereq–SLC postbac or #)
Using audio, video, and computer technology in second language teaching/learning in classroom, independent study, and distance education environments.

LgTT 5710. Special Topics in Language Teaching and Technology. (1-3 cr [max 12 cr])
Examine, evaluate, apply specific area of technology to K-higher education, second/foreign language teaching/learning in classroom, independent study, distance education environments.

Latin (Lat)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Lat 1001. Beginning Latin I. (5 cr)
Gradual mastery of Latin structure in order to attain reading knowledge; practice in oral reading and composition.

Lat 1002. Beginning Latin II. (5 cr. Prereq–1001 or equiv)
Continuing work on Latin grammar and syntax; graduated readings from Roman authors including Cicero, Catullus, and Roman comedy.

Lat 1111H. Honors Course: Beginning Latin. (3 cr. Prereq–¶1112; regis in honors program or high ability as indicated by high school transcript)
Intensive Latin course covering material usually taught over two semesters. Students must also register for 1112 when taking this class.

Lat 1112H. Honors Course: Beginning Latin, Recitation. (3 cr. Prereq–¶1111, regis in honors program or high ability as indicated by high school transcript)
Drills and composition exercises. Students must also register for 1111 when taking this class.

Lat 3100. Reading Latin Prose. (3 cr. Prereq–1002 or 1111 or 1112 or 3111 or 3112 or #)
Introduction to reading Latin prose. Selections from Roman authors. Review of grammar/syntax. Follow-up course to intensive Latin or review for students returning to reading Latin after time lapse.

Lat 3111. Intensive Latin. (3 cr. §1001, §1002, §1111. Prereq–¶3112; previous exper in another foreign language desirable.)
Intensive Latin course covering material usually taught over two semesters. Undergraduates must also register for 3112 when taking this class.

Lat 3112. Intensive Latin, Recitation. (3 cr. §1001-1002, §1112. Prereq–¶3111; previous exper in another foreign language desirable.)
Drills and composition exercises. Students must also register for 3111 when taking this course.

Lat 3113. Republican Latin Authors. (4 cr. Prereq–1002 or 1111 or 3111 or 3 yrs high school Latin or Δ)
Intermediate Latin reading featuring selections from Caesar, Cicero and Catullus. Grammar review; introduction to Latin metrics; history and culture of the late republic.

Lat 3114. Augustan Latin Authors. (4 cr. Prereq–3113 or Δ)
Students progress from intermediate to advanced Latin reading while surveying the world of Augustan Rome. Authors include Livy, Virgil, and Ovid.

Lat 3310. Advanced Undergraduate Latin: History. (3 cr [max 12 cr]. Prereq–3114 or equiv or #)
Roman history as the Romans wrote it; selections from Livy, Sallust, Tacitus, or Ammianus.

Lat 3320. Advanced Undergraduate Latin: Belles-Lettres. (3 cr [max 12 cr]. Prereq–3114 or equiv or #)
Selections from expository Latin literature (essays, epistles, monographs).

Lat 3330. Advanced Undergraduate Latin: Oratory. (3 cr [max 12 cr]. Prereq–3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3340. Advanced Undergraduate Latin: Epic/Pastoral. (3 cr [max 12 cr]. Prereq–3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3350. Advanced Undergraduate Latin: Lyric/Elegiac. (3 cr [max 12 cr]. Prereq–3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3360. Advanced Undergraduate Latin: Drama. (3 cr [max 12 cr]. Prereq–3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3370. Advanced Undergraduate Latin: Satire. (3 cr [max 12 cr]. Prereq–3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3440. Advanced Undergraduate Latin: Later Latin. (3 cr [max 12 cr]. Prereq–3114 or Δ)
Reading course covering authors of Late Antiquity, the Middle Ages and the Renaissance. Topics specified in *Class Schedule.*

Lat 3450. Advanced Undergraduate Latin: Classical Authors. (3 cr [max 12 cr]. Prereq–3114 or Δ)
Readings from various classical Latin authors. Topics specified in *Class Schedule.*

Lat 3951. Major Project. (4 cr. Prereq–Greek-Latin or Latin major, three 3xxx Latin courses or #)
Research project using documents and other sources from the ancient world. Students select project in consultation with a faculty member who directs the research and writing.

Lat 3960H. Honors Course: Advanced Undergraduate Latin Reading. (3 cr [max 12 cr]. Prereq–Regis in honors program or high ability as indicated by transcript)
Student attends Latin 33xx, 3440, or 3450 and does additional work for honors credit.

Lat 3993. Directed Studies. (1-4 cr [max 12 cr]. Prereq–# and Δ)
Guided individual reading or study.

Lat 5012. Latin Prose Composition. (3 cr. Prereq–3114 or Δ)
Advanced understanding of Latin grammar, syntax, diction, and prose style through graduated exercises in prose composition.

Lat 5032. Text Criticism. (3 cr. Prereq–3114)
Theory and practice. Elements of paleography and manuscript study. Basic tools for analyzing a textual apparatus with some independence; constructing a critical edition of a literary text.

Lat 5310. Latin Literature: History. (3 cr [max 12 cr])
One or more appropriate authors studied each semester.

Lat 5320. Latin Literature: Epistles and Essays. (3 cr [max 12 cr])
One or more appropriate authors studied each semester.

Lat 5330. Latin Literature: Oratory. (3 cr [max 12 cr])
One or more appropriate authors studied each semester.

Lat 5340. Latin Literature: Epic and Pastoral. (3 cr [max 12 cr])
One or more appropriate authors studied each semester.

Lat 5350. Latin Literature: Lyric and Elegiac Poetry. (3 cr [max 12 cr])
One or more appropriate authors studied each semester.

Lat 5360. Latin Literature: Latin Dramatists. (3 cr [max 12 cr])
One or more appropriate authors studied each semester. Authors vary.

Lat 5370. Latin Literature: Satire. (3 cr [max 12 cr]. Prereq–Grad student or #)
One or more authors.

Lat 5380. Latin Literature: Legal Texts. (3 cr [max 12 cr])
One or more appropriate authors studied each semester.

Lat 5390. Literature: Religious Texts. (3 cr [max 12 cr]. Prereq–3114)
Reading and discussion of religious texts from Latin antiquity, such as Varro's Antiquitates Divinae, Cicero's De natura deorum, Apuleius's Metamorphoses, or Christian writers (Tertullian, Cyprian, Lactantius, Jerome, Augustine).

Lat 5410. Latin of Late Antiquity. (3 cr [max 12 cr]. Prereq–34xx or equiv or #)
Pagan and Christian Latin literature selected from authors of the 3rd to 6th centuries A.D. Topics specified in *Class Schedule.*

Lat 5420. Medieval Latin. (3 cr [max 12 cr]. Prereq–34xx or equiv or #)
Literature from 6th to 15th centuries. Authors and genres vary; topics specified in *Class Schedule.*

Lat 5621. Latin Paleography. (3 cr. Prereq–Three 3xxx-5xxx Latin cr or #)
Analysis of various hands used in manuscripts of Latin authors with attention to date and provenance; transmission of ancient Latin literature.

Lat 5715. Introduction to the Historical-Comparative Grammar of Greek and Latin. (3 cr. Prereq–# or 2 yrs college Greek)
Historical and comparative grammar of Greek and Latin from their Proto-Indo-European origins to the classical norms.

Lat 5717. History of Latin. (3 cr)
Reading and analysis of documents illustrating the stylistic registers and evolution of the Latin language from its earliest attestations through the Middle Ages.

Lat 5993. Directed Studies. (1-4 cr [max 18 cr]. Prereq–#, Δ)
Guided individual reading or study.

Lat 5994. Directed Research. (1-12 cr [max 20 cr]. Prereq–#, Δ)
Guided research on original topic chosen by student.

Lat 5996. Directed Instruction. (1-12 cr [max 20 cr]. Prereq–#, Δ)
Supervised teaching internship.

Latin American Studies (LAS)

Institute of International Studies

College of Liberal Arts

LAS 3017. Peoples and Cultures of Middle America. (3 cr. §Anth 3017)
Surveys the Indian and Mestizo (Hispanic) cultures of Mexico and Guatemala and parts of Belize, Honduras, and Nicaragua. Describes both pre-Hispanic and Hispanic influences, with attention to area-wide patterns and local traditions.

LAS 3019. Hispanic Cultures of Latin America. (3 cr. §Anth 3019. Prereq–1003 or #)
An overview of Hispanic cultures from Mexico to South America covering topics such as economy, underdevelopment, the family and ritual kinship, gender, religion, values, ideology, and change. Several concepts are introduced to explore continuity and change.

LAS 3114. International Perspectives—U.S.-Mexico Border Cultures. (3 cr. §Chic 3114)
Examines the relations of Mexico and the United States from an international perspective, with an central focus on the cultural interchange in the border lands between the United States and Mexico, using both literary and historical materials.

LAS 3251. Role of Renewable Natural Resources in Developing Countries. (1 cr; A-F only. §FR 3251)
International perspectives on important resource issues including integration of natural resource, social, and economic considerations. Overviews of issues and case studies.

LAS 3401W. Early Latin America to 1825. (4 cr. §Hist 3401)
Native American and colonial periods to 1825, with emphasis on social, cultural, and economic aspects.

LAS 3402W. Modern Latin America: 1825 to Present. (4 cr. §Hist 3402)
National and contemporary period 1825 to present, with emphasis on social, cultural, political, and economic change.

LAS 3405. Latin American Women's Lives. (3 cr. §WoSt 3405. Prereq–WoSt 1001, WoSt 1002 or WoSt 1003 or #)
An interdisciplinary approach to understanding women's lives in Latin America. Use of ethnography, history, poetry, fiction, and "testimonio" to understand the conditions of women's lives in Latin America.

LAS 3427. History of Cuba and Puerto Rico. (3 cr. §Chic 3427, §Hist 3427)
Historical development of Cuba and Puerto Rico from pre-Columbian times through Spanish conquest to the present. Conquest and colonization, slavery, Hispanic Caribbean society and culture, Operation Bootstrap, Cuban Revolution.

LAS 3428. History of Relations Between U.S. and Mexico: 1821 to Present. (3 cr. §Chic 3428, §Hist 3428)
U.S.-Mexico relations in the 19th and 20th centuries. Examines histories as they intersect in the late 1820s through the loss of Texas, the Mexican-American War, and economic relations between the two countries including NAFTA and the Chiapas rebellion of 1994.

LAS 3441. Chicana/o History to 1900. (3 cr. §Chic 3441, §Hist 3441)
The history of the Mexican people from the 16th through 19th centuries. Historical theories of colonialism, expansion, economy, assimilation, migration and settlement; race, class and gender, political, social and cultural interaction, and conflict.

LAS 3442. Chicano History to Present. (3 cr. §Chic 3442, §Hist 3442)
The 20th-century Chicana/o experience: migration, repatriation, the Bracero program, politics, the Chicana/o movement, work, society, and culture.

LAS 3502W. Foundations of Brazilian Culture. (3 cr. §Port 3502. Prereq–Port 3003 or equiv)
Emphasis on Brazilian modern society. History, culture (music, art, cinema, literature, intellectual thought, popular culture, media), and social problems (ethnicity, tropical deforestation). Discussions and readings are in Portuguese.

LAS 4121W. Geography of Latin America. (3 cr. §Geog 4121)
Interplay of natural environment and history in shaping contemporary Latin America. Political ecology of natural resources, food supply and distribution, urbanization and the informal economy, migration, ethnicity, and the role of the state and international agencies in domestic economies.

LAS 4465. Housing in World Perspective. (3 cr; A-F only. §DHA 4465. Prereq–DHA 2401, DHA 2463 or #)
Evaluation of theories and concepts that allow an understanding of housing policies and housing choices of individuals, families, and households in developed and developing countries.

LAS 4479. Latin American Government and Politics. (3-4 cr. §Pol 4479. Prereq–Pol 1054 or Pol 3051 or non-pol sci grad or #)
An overview of Latin American politics and political economy focused on authoritarianism, human rights, and redemocratization; development and economic policy; social movements; ethnicity and race; religion; revolution; U.S.-Latin American relations.

Learning and Academic Skills (LASk)

Department of Educational Psychology

College of Education and Human Development

LASk 1001. Mastering Skills for College Success. (2 cr)
Practical assistance to develop efficient, effective learning/academic performance skills. Improve reading, memorization, test-taking, critical thinking; identify academic and career Learning styles, motivation, life skills, and their relation to successful academic performance.

LASk 1101. Academic Success. (1 cr; S-N only. Prereq–#)
Identifying factors interfering with academic performance, selecting strategies, and establishing a plan to promote academic success. Learning-style, educational goals, life management skills, motivation, attitude.

Linguistics (Ling)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

Ling 1701. Language and Society. (4 cr)
Role of language in human social interaction; linguistic indicators of social status and attitudes; language and sex roles; linguistic ecology; language planning for multilingual communities; implications for education and public policy.

Ling 1909W. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

Ling 3001. Introduction to Linguistics. (4 cr. §3011, §5001)
Phonetics, phonology, morphology, syntax, semantics, and historical-comparative linguistics; language learning and psychology of language; linguistic universals; language in society.

Ling 3001H. Honors: Introduction to Linguistics. (4 cr. §3001, §3011, §5001. Prereq–Honors candidate or #)
Phonetics, phonology, morphology, syntax, semantics, historical-comparative linguistics, language learning, psychology of language, linguistic universals, language in society.

Ling 3051H. Honors: Thesis. (3 cr. Prereq–Linguistics honors candidate, #)
Supervised planning and research for honors thesis to be completed in 3052.

Ling 3052H. Honors: Thesis. (3 cr. Prereq–3051)
Supervised research, writing, and revision for honors thesis begun in 3051.

Ling 3101W. Languages of the World. (3 cr. Prereq–3001 or 3011 or #)
Survey of language families of the world; classifying languages genetically and typologically; historical relationships among languages.

Ling 3301. Introduction to Phonetics. (4 cr. §5301. Prereq–3001 or 3011 or 5001 or ¶3001 or ¶3011 or ¶5001 or #)
Phonetic analysis and transcription of speech. Exploration of articulatory and acoustic correlates of speech sounds. Extensive practice transcribing. Emphasis on narrow transcription of human speech. One section focuses on universal phonetics, another provides emphasis on English.

Ling 3601. Introduction to Historical Linguistics. (3 cr. §5601. Prereq–3001 or #)
Historical change in phonology, syntax, semantics, and the lexicon; linguistic reconstruction; genetic relationship among languages.

Ling 3707. Ethnic Bilingualism in the United States. (3 cr. Prereq–Some knowledge of linguistics and a 2nd language helpful)
Social, behavioral, and cognitive aspects of bilingualism; the linguistic experience of American immigrants and ethnic minority groups, especially Asian Americans; attitudes and public policies with regard to linguistic minorities; field experience in bilingual communities.

Ling 4002. Linguistic Analysis. (3 cr. §5201, §5302. Prereq–3001 or 5001 or #)
Techniques for analyzing phonological, morphological, and syntactic data from a variety of languages; discovering, stating, and justifying generalizations; comparison of diverse languages.

Ling 4901W. Senior Project. (1 cr; S-N only. Prereq–Ling major, #)
Revision and/or expansion of a paper completed for a linguistics course.

Ling 5001. Introduction to Linguistics. (4 cr. §3001, §3011. Prereq–Grad or #)
Phonetics, phonology, morphology, syntax, semantics, and historical-comparative linguistics; language learning and psychology of language; linguistic universals; language in society.

Ling 5005. Applications of Linguistics. (3 cr. Prereq–3001 or 3011 or 5001 or #)
Relationships between linguistics and neighboring disciplines. Applications to practical fields such as lexicography, orthography, translation/interpreting, language planning, reading, language teaching, bilingual education, education of the deaf, and correction of language disorders. Computer applications, forensic applications. Topics vary with each offering.

Ling 5101. Language Types and Linguistic Universals. (3 cr. Prereq–3001 or 3011 or 5001 or #)
Comparison of languages and language types; cross-linguistic similarities and universals of language, and their explanation.

Ling 5105. Field Methods in Linguistics I. (4 cr. Prereq–5201, 5302 or #)
Techniques for obtaining and analyzing linguistic data from unfamiliar languages through direct interaction with a native speaker.

Ling 5106. Field Methods in Linguistics II. (4 cr. Prereq–5105)
Techniques for obtaining and analyzing linguistic data from unfamiliar languages through direct interaction with a native speaker.

Ling 5201. Introduction to Syntax. (3 cr. Prereq–3001 or 3011 or 5001 or #)
Examination of syntactic phenomena and constructions in a variety of languages; principles of grammar construction and evaluation; syntactic theories as instruments of grammatical analysis.

Ling 5202. Syntactic Theory. (3 cr. Prereq–5201)
A thorough foundation in modern syntactic theory through the investigation of a number of syntactic phenomena in various languages. Emphasizes syntactic argumentation and the development of constraints on grammar formalisms.

Ling 5205. Semantics. (3 cr. Prereq–5202 or #)
Analysis of sentence meaning with attention to semantic properties and relations such as analyticity, entailment, quantification, and genericity. Philosophical background; formal techniques of semantic analysis; how sentence meaning depends on word meaning, syntax, and context. The role of semantics in grammatical theory.

Ling 5206. Linguistic Pragmatics. (3 cr. Prereq–5201, 5205 or #)
The analysis of linguistic phenomena in relation to beliefs and intentions of language users; speech act theory, conversational implicature, presupposition, information structure, relevance theory, discourse coherence.

Ling 5301. Introduction to Phonetics. (4 cr. §3301. Prereq–3001 or 3011 or 5001 or ¶5001 or #)
Phonetic analysis and transcription of speech. Exploration of articulatory and acoustic correlates of speech sounds. Extensive practice transcribing. Emphasis on narrow transcription of human speech. One section focuses on universal phonetics, another provides emphasis on English.

Ling 5302. Introduction to Phonology. (3 cr. Prereq–5301)
Concepts and types of information needed for describing patterns in the sounds of words, for all speakers of all human languages, including current theoretical frameworks. Extensive practice identifying and analyzing phonological patterns in the words of a language.

Ling 5303. Phonological Theory. (3 cr. Prereq–5302 or #)
Further exploration of the phonology of human languages. The course will prepare students to read papers in the literature and to do informed research in phonology.

Ling 5461. Conversation Analysis. (3 cr. §Spch 5461. Prereq–3001 or 3011 or 5001 or #)
Discourse processes. Application of concepts through conversation analysis.

Ling 5462. Field Research in Spoken Language. (3 cr. §Spch 5462. Prereq–5461 or Spch 5461 or #)
Transcribing and analyzing talk and movement related to talk. Applying concepts to recorded conversations.

Ling 5501. Introduction to Language Acquisition. (3 cr. Prereq–3001 or 3011 or 5001 or #)
Overview of first and second language acquisition. Does not fulfill degree requirements for majors in linguistics or the MA in ESL.

Ling 5505. Introduction to Second Language Acquisition. (3 cr. Prereq–3001 or 3011 or 5001, a course on phonological and grammatical structure of a language)
Introduction to research on the language and learning processes of second-language learners: the linguistic structure of their interlanguage, the cognitive and social factors which influence their acquisition of a new language.

Ling 5601. Introduction to Historical Linguistics. (3 cr. §3601. Prereq–3001 or 3011 or 5001)
Historical change in phonology, syntax, semantics and the lexicon; linguistic reconstruction; genetic relationship among languages.

Ling 5701. Sociolinguistics. (3 cr. Prereq–3001 or 3011 or 5001 or #)
Social determinants of linguistic diversity, variation, and change. Topics may include social and regional dialects, language style and register, style-shifting and code-switching, the quantitative study of speech, linguistic and social inequality.

Ling 5721. Bilingualism. (3 cr. Prereq–3001 or 3011 or 5001 or #)
Sociolinguistic theory and methods in the study of bilingualism; language ecology in multilingual societies; language and language behavior in the bilingual individual; language in ethnic conflict; implications for public policy and planning.

Ling 5801. Introduction to Computational Linguistics. (3 cr. Prereq–3001 or 3011 or 5001 or #; programming experience helpful)
Methods and issues in computer understanding of natural language. Programming languages and their linguistic applications. Lab projects.

Ling 5802. Computational Linguistics. (3 cr. Prereq–5801 or #)
Computer processing of natural language. Applications to such areas as speech recognition and information retrieval.

Ling 5900. Topics in Linguistics. (1-4 cr [max 12 cr]. Prereq–#)
Topics vary. See *Class Schedule*.

Ling 5931. Fundamentals of Contemporary English. (3 cr. Prereq–3001 or 3011 or 5001 or #)
Word and sentence structure of contemporary English.

Ling 5932. Descriptive Studies of Modern English. (3 cr. Prereq–3001 or 3011 or 5001, 5201 or 5931 or #)
Studies of selected aspects of the morphology, syntax, and/or semantics/pragmatics of modern English with emphasis on analysis of written or recorded texts.

Ling 5993. Directed Study. (1-3 cr [max 10 cr]. Prereq–#, Δ, ❑)
Directed study for Linguistics.

Management (Mgmt)

Department of Strategic Management

Curtis L. Carlson School of Management

Mgmt 1350. Introduction to Business and Business Careers. (3 cr; A-F only. Prereq–CSOM student, at least 20 cr)
Organizations as systems, profit centers, and political communities. Current business issues, trends for the future. Concepts applied to other settings. Basic business processes, needs, contexts, problems.

Mgmt 3001. Fundamentals of Management. (3 cr; A-F only. Prereq–30 cr)
General aspects/characteristics of organizations and their members. Why people/groups in organizations feel/behave as they do. Processes/methods that improve behavior/attitudes/effectiveness of organizational members. Organizational member/manager skills. Guest speakers, group presentations, films.

Mgmt 3014. Topics in International Business, Government, and Society. (4 cr; A-F only)
Selected topics.

Mgmt 3040. Understanding the International Environment of Firms: International Business. (3 cr; A-F only. Prereq–3001, CSOM upper-div major)
Theories, frameworks, tools, and facts for understanding the environment of firms in international competition. Main world-level economic flows (trade, investment, finance). How country-/industry-level economic, political, and sociocultural factors influence behavior/functions of firms in international competition.

Mgmt 3070. Topics in Management. (4 cr; A-F only. Prereq–At least 60 cr [completed or in progress])
Selected topics.

Mgmt 3080. Topics in Ethics. (4 cr; A-F only. Prereq–At least 60 cr [taken or in progress])
Topics vary with each offering.

Mgmt 3090. Topics in Leadership. (4 cr; A-F only. Prereq–At least 60 cr [completed or in progress])
Selected topics.

Mgmt 4002. Managerial Psychology. (4 cr; A-F only)
Behavioral principles, methods, and skills that underlie and compose dimensions of managerial competence and contribute to managers' effectiveness in preventing and solving problems within and between individuals and groups; development of human resource skills management needs based partially on experiential exercises.

Mgmt 4004W. Business Policy: Strategy Formulation and Implementation. (3 cr; A-F only. Prereq–90 credits; completion of business core courses)
Integrative perspective on overall direction of the enterprise involving both choice of products and markets and selection of organization structures and management styles; case analysis involving the identification of key issues, evaluation of options, and making recommendations under conditions of uncertainty and incomplete information.

Mgmt 4005. Managing the Multinational Business. (4 cr; A-F only. Prereq–BGS 3040)
Structures/strategies of global business. Personnel, technology, and operations in host nations. Challenges unique to management of multinational firm. May include topics such as comparative culture, trade, and ethics.

Mgmt 4006. Small Business Management. (4 cr; A-F only. Prereq–3001, CSOM upper div)
Role of small business, alternative entry strategies, functional expertise required as a firm competes in its environment.

Mgmt 4008. Entrepreneurial Management. (4 cr; A-F only)
Assessing the opportunities and managing the constraints in developing new business; structuring the venture, perceiving the critical issues, and obtaining the skills needed to succeed. Management, operations, marketing, financial, legal, and competitive issues. The business plan for start-ups, buyouts, franchises, and the family firm.

Mgmt 5004. Negotiations. (2 cr; A-F only)
Art and science of securing agreements between two or more parties who are interdependent and who are seeking to maximize their own outcomes; understanding individual, group, and organizational behavior in the context of these competitive situations; theory and process of negotiation applied to broad spectrum of problems faced by managers and professionals.

Mgmt 5019. Business, Natural Environment, and Global Economy. (2 cr; A-F only. Prereq–MBA student)
Resource deployment policies that affect the natural environment. Sustainability. Local/global environmental threats, how government policies address these issues. Business strategies/practices that produce "win-win" outcomes.

Mgmt 5050. Management of Innovation and Change. (2 cr; A-F only. Prereq–3001, CSOM upper div)
Applying theories/research on how new organizational programs, products, and technologies are developed/implemented. Diagnostic skills. How innovation unfolds.

Mgmt 5101. Advanced Topics. (4 cr; A-F only)
Specialized topics in management that vary and may include downsizing, ethics, trust, risk, alliances, organizational identity, organizational change, industry definition, team performance, organizational renewal, competitive advantage, hypercompetition, managing the knowledge worker, competence acquisition and preservation, and negotiation.

Mgmt 5175. Managing in Newly Emerging Global Markets. (2 cr)
Understanding the institutional and cultural environments in major new emerging markets. Focus is on two or three countries from emerging markets (such as China, India, Eastern Europe, Mexico, Brazil and others), the problems and opportunities provided by these environments, and how to do business in these countries.

Mgmt 5177. The Business Plan. (2 cr; A-F only. Prereq–[4008, Acct 5160] or #)
Understanding the structure of business plans. Critically analyzing business plans. Formulating an original business plan.

Manufacturing Technology (MT)

College of Continuing Education

MT 4001. Manufacturing Cost Accounting, Analysis, and Control. (3 cr; A-F only)
Basic accounting concepts. Financial statements. Analysis/control of current assets. Income tax planning. Cost analysis. Standard costs for product costing. Time value of money. Quantifying risk/uncertainty. Utility theory, cost of capital, capital structure. Capital budgeting under capital rationing. Management decisions and investment.

MT 4011. Design of Manufacturing Systems and Simulation. (3 cr; A-F only)
Design/analysis of manufacturing systems: flow lines, assembly systems, cellular manufacturing, flexible manufacturing, automated systems. Control issues in manufacturing systems: facility layout, scheduling, batch sizing, group technology, bottleneck management. Modeling/analysis tools, including computer simulation and operations.

MT 4012. Manufacturing Processes. (3 cr; A-F only)
Description/modeling of commonly used manufacturing processes. Process descriptions, process capabilities/performance, process models relating process parameters to part/process characteristics, process control.

MT 4015. Quality Engineering. (3 cr; A-F only)
Statistical, engineering, and management approaches to quality improvement. Economics. Teams and information systems. Problem-solving. Function deployment. Value analysis. Reliability engineering. Design for manufacturability analysis. Experiment design. Statistical control. Process validation/capability. Standards, audits, certification.

MT 4021. Properties of Materials. (3 cr; A-F only)
Classification of materials. Atomic bonding, crystal structures, diffusion, structure/properties of materials. Ceramics, polymers, wood, concrete. Corrosion of materials. Elasticity, plasticity, strengthening mechanisms, failure modes, phase diagrams. Transformations and thermal processing.

MT 4025. Computer Integrated Manufacturing. (3 cr; A-F only)
Manufacturing systems as open systems. Manufacturing system design. Information flow and computer networks. Network classification/services, hardware components. Network protocols/architecture applied to product design/manufacturing. Computer software used to simulate system/environment interaction.

MT 4031. Engineering Materials Processing I. (3 cr; A-F only)
Manufacture of products. Manufacturing process. Casting, forming, cutting, sheet-metal working. Theories, practice. Lab.

MT 4032. Engineering Materials Processing II. (3 cr; A-F only)
Computer-Aided-Manufacturing (CAM), joining processes. Processing of non-traditional machining. Surface-finishing processes. Lab.

MT 4041. Fluid Mechanics. (3 cr; A-F only)
Pressure/flow measurements, hydrostatic force, continuity/momentum equations, flow in conduits, velocity distribution, drag force, pump calculations, flow through porous media.

MT 4042. Manufacturing Automation. (3 cr; A-F only)
CNC programming, computer-aided manufacturing (CAM), flexible automations, machining centers, robotics, programmable logic controllers, tooling systems, work holding devices.

MT 4102. Machine Control. (3 cr; A-F only)
Discrete control, digital control logic, sequential and feedback control, programmable logic controllers, stepper motors, other devices. Motion control methods, performance. Control languages/techniques, systems hierarchy.

MT 4105. Machine Tool Design. (3 cr; A-F only)
Precision, drives, economy. Cutting/forming tool materials, geometries, selections, sharpening, and standards. Designing Jigs, fixtures, and pressworking tools.

MT 4201. Statistical Process Control. (3 cr; A-F only)
Cost of quality, hypothesis testing, control charts, other methods. Process capability, acceptance sampling methods, reliability, gage capability studies. Designing experiments. Factorial designs, Six Sigma concepts, computer analysis methods, blocking/randomizing trials. Impact of Taguchi methods.

MT 4301. Design and Analysis of Experiments. (3 cr; A-F only)
Introduction to applications of statistical methods used by industrial researchers to aid in solving industrial problems. Analysis of means, analysis of variance, factorial designs, fractional factorial (screening) designs. Industrial case studies. Experience at local industries when available.

MT 4501. Manufacturing Product/System Design I. (3 cr; A-F only)
Student teams develop a part or product from requirement definition through prototype fabrication. Definition of product requirements, development of product/tooling design, analysis, definition of fabrication process, development of quality assurance plan, fabrication of prototype, inspection/testing. Capstone project.

MT 4511. Manufacturing Product/System Design II. (3 cr; A-F only)
Continuation of Manufacturing Product/System Design I. Broader experience in manufacturing product and system design. Focuses on involving other stakeholders in design/production of a product. Products from student's workplace, teamwork. Final report. Capstone project.

Marathi (Mar)

Department of Asian Languages and Literatures
College of Liberal Arts

Mar 1101. Beginning Marathi. (4 cr. §3101)
Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Mar 1102. Beginning Marathi. (4 cr. §3102. Prereq–1101 or equiv or #)
Emphasis on developing proficiency in all four language modalities—listening, reading, speaking, and writing.

Mar 3101. Beginning Marathi. (4 cr. §1101)
Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Mar 3102. Beginning Marathi. (4 cr. §1102. Prereq–3101 or equiv or #)
Emphasis on developing proficiency in all four language modalities—listening, reading, speaking, and writing.

Mar 3131. Intermediate Marathi. (4 cr. Prereq–1102 or 3102 or equiv or #)
Speaking and comprehension; development of reading and writing skills based on Marathi-language material.

Mar 3132. Intermediate Marathi. (4 cr. Prereq–3131 or equiv or #)
Speaking and comprehension; development of reading and writing skills based on Marathi-language material.

Mar 5992. Directed Readings. (3-5 cr [max 12 cr]. Prereq–#, Δ, ❑)
Individualized guided reading or study of modern Marathi texts.

Mar 5994. Directed Research. (3-5 cr [max 12 cr]. Prereq–#, Δ, ❑)
Directed research on a subject agreed upon by student and instructor.

Marketing (Mktg)

Department of Marketing and Logistics Management
Curtis L. Carlson School of Management

Mktg 3001. Principles of Marketing. (2 cr; A-F only. Prereq–Econ 1101, 50 cr)
Introduction to terms, concepts, and skills for analyzing marketing problems. Factors outside the organization affecting its product, pricing, promotion, and distribution decisions. Cases from actual organizations. Requires written marketing plan, done individually or as team.

Mktg 3010. Marketing Research. (4 cr; A-F only. Prereq–3001, [OMS 1550 or equiv])
Methods for collecting/analyzing data to solve marketing problems. Research design, secondary/primary data collection, sample design, data analysis.

Mktg 4020. Advanced Logistics and Supply Chain Management. (2 cr; A-F only. Prereq–3001)
Analysis of the flow of physical product through channels of distribution and the linkages between the process of controlling such physical flows and the major functions of the firm, e.g., finance, marketing, and operations. Emphasis on organizing the interactions between firms and developing an integrative supply chain management strategy.

Mktg 4030. Selling and Sales Management. (4 cr; A-F only. Prereq–3001)
Emphasizes understanding the role of a sales manager to develop and implement a sales force plan that is an integral part of a company's marketing strategy. Special attention on the impact of the sales manager's decisions on the behavior of an individual sales person.

Mktg 4040. Buyer Behavior. (4 cr; A-F only. Prereq–3001)
Application of the behavioral sciences to understanding buyer behavior. Topics include perception, memory, affect, learning, persuasion, motivation, behavioral decision theory, social and cultural influences, and managerial implications.

Mktg 4050. Integrated Marketing Communications. (4 cr; A-F only. Prereq–3001)
Management of the communication aspect of marketing strategy. Emphasis on advertising, sales promotion, public relations, and direct marketing. Topics include setting communications objectives and budgets, media selection, creative strategy, and sales promotion techniques.

Mktg 4060. Marketing and Distribution Channels. (4 cr; A-F only. Prereq–3001)
Design and management of channels of distribution in both consumer and industrial settings. Analysis of the inter-relationships between marketing institutions in channels of distribution. Includes discussion and analysis of logistics and supply chain strategies.

Mktg 4070. International Marketing. (2 cr; A-F only. Prereq–3001)
Managing international marketing functions. Identifying marketing-based international business opportunities; understanding cultural factors in buyer behavior, constructing and evaluating global and culturally adjusted marketing strategies.

Mktg 4080. Marketing Strategy. (4 cr; A-F only. Prereq–3001)
Determination of product markets where organizations should compete based on their ability to create and maintain a competitive advantage. Emphasis on analyzing the external environment of business and the formation of a marketing strategy.

Mktg 4090. Marketing Topics. (2 cr; A-F only. Prereq–3001)
Selected topics and problems of current interest considered in depth. Class discussion and course projects.

Materials Science (MatS)

Department of Chemical Engineering and Materials Science

Institute of Technology

MatS 1001. Advances in Chemical Engineering and Materials Science. (1 cr; S-N only. Prereq–Recommended for [chemical engineering, materials science/engineering] majors)
Introduction to chemical engineering, materials science/engineering. Practical examples of important advances in both fields. Design problems, career opportunities. Lectures, demonstrations, interactive exercises.

MatS 2001. Introduction to the Science of Engineering Materials. (3-4 cr. Prereq–2nd year IT [no credit for MatS majors])
Introduction to structure-property relationships of engineering materials. Atomic structure and bonding; crystal structures; imperfections in solids; strength of materials and strengthening mechanisms; phase transformations; heat treatment and control of microstructures; materials selection and design. Integrates properties of metals, ceramics, polymers, and composites. Laboratory experiments deal with material strength, creep, and fatigue of engineering alloys, and heat treatment of steel and aluminum.

MatS 2601. Introduction to Materials Science (Honors). (3 cr. Prereq–IT lower div honors program)
Physical principles which govern materials properties at the microscopic scale. Starting from the atomic structure and interatomic bonding, it moves to more complex, physical properties: mechanical, electrical, optical, and thermodynamical properties.

MatS 3011. Introduction to Materials Science and Engineering. (3 cr. Prereq–Chem 1021, Math 1272 or 1372, Phys 1302)
Builds progressively from electrons to atoms to bonding to crystal structures. Defects, X-ray diffraction, phase diagrams, microstructure as a basis for understanding mechanical/electrical properties. Metals, polymers, ceramics, semiconductors, composites.

MatS 3012. Metals and Alloys. (3 cr. Prereq–[Grade of at least C in 3011, [MatS or ChEn upper div]] or #)
Structure of metals/alloys. Crystal structure/defects (point defects, dislocations, grain boundaries). Microstructure. Properties of metals, especially mechanical properties.

MatS 3041. Industrial Assignment I. (2 cr; A-F only. Prereq–MatS upper div, completion of required courses in MatS program through fall sem of 3rd yr, GPA of at least 2.80, regis in co-op program)
Industrial work assignment in engineering co-op program. Formal written report.

MatS 3801. Structural Characterization Lab. (2 cr; A-F only. Prereq–[Grade of at least C in 3011, MatS upper div] or Δ)
Characterization of structure of engineering materials by optical/electron microscopy, atomic force microscopy, x-ray diffraction, spectroscopic method, related methods. Crystallography, defects, microstructure, macromolecular structure. Specimen preparation, data collection/analysis, maintaining laboratory notebook.

MatS 3851W. Materials Properties Lab. (2 cr; A-F only. Prereq–[Grade of at least C in 3011, MatS upper div] or Δ)
Characterization of properties of engineering materials. Mechanical, electrical, optical, magnetic, thermal properties. Relationship between properties, materials structure. Specimen preparation. Data collection/analysis, including statistical analysis. Laboratory notebook/report writing.

MatS 4001. Thermodynamics of Materials. (4 cr. Prereq–MatS upper div)
Fundamental thermodynamic concepts, 1st, 2nd, 3rd Laws. Behavior of gases, liquids, solids. Phase diagrams. Reaction equilibria involving gases, condensed phases. Use of computer-based thermodynamic program(s). Electrochemistry.

MatS 4002. Mass Transport and Kinetics. (4 cr. Prereq–CE 3101, upper div MatS)
Mass transport in solids: solid state diffusion, Fick's laws, defects/diffusion mechanisms. Mass transport in fluids: fluid flow, diffusion with convection, mass transfer. Kinetics of chemical reactions and phase transformations. Computer-based problems illustrating applications.

MatS 4013. Electrical and Magnetic Properties of Materials. (3 cr. Prereq–[Grade of at least C in 3011, upper div [MatS or ChEn]] or #)
Electronic/magnetic properties of solids. Simple band theory of solids. Free electron theory of conductivity/transport. Optical/dielectric response functions. Elementary theory of magnetism. Electronic devices. Superconductivity. Computer-based problems to illustrate applications.

MatS 4041. Industrial Assignment II. (2 cr; A-F only. Prereq–3041, completion of required courses in MatS program through fall sem of 4th yr, GPA of at least 2.80, registration in co-op program)
Industrial assignment in engineering co-op program. Application of materials science principles to engineering design problems in an industrial work environment. Formal written report.

MatS 4212. Ceramics. (3 cr. Prereq–[Grade of at least C in 3011, [MatS or ChEn] sr] or #)
Structure of ceramics: crystal structures, non-crystalline (glass) structures, microstructure. Ceramic phase relationships: binary/ternary diagrams. Ceramic properties: thermal, mechanical, electrical, magnetic, optical. Computer applications.

MatS 4214. Polymers. (3 cr. Prereq–[Grade of at least C in 3011, [MatS or ChEn] sr] or #)
Polymer structure-property relations: structure/morphology of crystalline/amorphous state. Crystallization kinetics. Vitrification and glass transition. Mechanical properties, failure, permeability, optical/electrical properties, polymer composites, effect of processing on properties.

MatS 4221. Materials Design and Performance. (4 cr. Prereq–MatS 3012 or #)
Thermal and mechanical processing to control properties, selection of materials for electronic applications and other applications, analysis of costs/performance, analysis of failure in metallurgical structures by use of fracture mechanics methodology. Laboratory experiments involve creep, fracture, fatigue, optical and SEM metallography, surface science analysis, and statistics.

MatS 4301W. Materials Processing. (4 cr. Prereq–MatS 4212 and 4214)
Casting, solidification and plastic forming of metals; powder processing, forming operations, sintering of ceramics; and processing of thermoplastic and thermoset polymers. Computer applications of data collection and reduction. Additional laboratory projects available to graduate students.

MatS 4400. Senior Design Project. (3 cr. §4401. Prereq–Sr MatS major)
Integration of coursework and lab experiences by applying scientific and engineering principles to comprehensive design project. Individual or team work on a project with faculty guidance. Areas of project selection typically include electronic materials, polymers, metals or ceramics. Written report and oral presentation required.

MatS 4401. Senior Design Thesis I. (2 cr; A-F only. §4400. Prereq–MatS senior, Δ, GPA of at least 3.00, project approval by faculty adviser)
First semester of a 2-semester thesis project. Research and design work directed by faculty member in Department of Chemical Engineering and Materials Science. Written reports are due at midsemester and end of semester. At least one research presentation must be given.

MatS 4402. Senior Design Thesis II. (2 cr; A-F only. Prereq–4401)
Second of 2-semester thesis project. Students continue thesis design project, write thesis, and give final presentation. Lecture portion meets concurrently with 4400.

MatS 4511W. Corrosion and Electrochemistry of Corrosion. (4 cr. Prereq–MatS 3011 or #, upper div IT or grad)
Electrochemical thermodynamics, electrochemical kinetics, theory of aqueous corrosion, theory of high temperature oxidation; specific topics include general corrosion, passivation, pitting, galvanic protection/corrosion, environmental degradation of mechanical properties, corrosion of electronic components, growth of oxide scales by diffusion, materials selection and design. Computers used to collect lab data.

MatS 4591. Independent Study in Materials Science. (1-3 cr [max 12 cr]. Prereq–Upper div mat sci)
Library, theoretical, laboratory or design studies of scientific or engineering topics in materials science for an individual student. Course content and credits by arrangement with professor. Design credits available if arranged with professor. May be used for upper division Honors Program experience if arranged with professor.

MatS 4593. Directed Study in Materials Science. (1-4 cr [max 12 cr]. Prereq–Upper div MatS)
This course can take two forms: (a) Library, theoretical or design studies of scientific or engineering topics in materials science for an individual or a small group of students. Course content and credits by arrangement with professor. Design credits available if arranged with professor. (b) Special topics course offered only once, e.g., by a visiting professor.

MatS 4594. Directed Research in Materials Science. (1-3 cr [max 12 cr]. Prereq–Upper div mat sci)
Research studies of scientific or engineering topics in materials science for an individual or small group of students. Course content and credits by arrangement with professor. Design credits available if arranged with professor. May be used for upper division Honors Program experience if arranged with professor.

MatS 5221. Introduction to Polymer Chemistry. (3 cr; A-F only. Prereq–[3501, Chem 2302] or #)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

MatS 5223W. Polymer Laboratory. (2 cr; A-F only. Prereq–5221 or Chem 5221 or 8221 or #)
Synthesis, characterization, and physical properties of polymers. Free radical, condensation, emulsion, anionic polymerization. Infrared spectroscopy/gel permeation chromatography. Viscoelasticity, rubber elasticity, crystallization.

MatS 5517. Electron Microscopy. (3 cr; A-F only)
Transmission electron microscope, scattering and diffraction, electron sources, lenses, apertures and resolution, specimen preparation, diffraction patterns, kikuchi diffraction, planar defects, strain fields, high resolution imaging, X-ray spectrometry.

MatS 5521. Thin Films and Interfaces. (3 cr. Prereq–IT upper div or grad student, MatS 4013 or #)
Fundamentals of vacuum science; vapor pressures and thin film deposition processes (physical and chemical vapor deposition, sputtering, laser ablation); thermodynamics and kinetics of thin film growth; epitaxy; film stability and reactions; structure-property relationship; multilayers and diffusion barriers; characterization techniques to include photon, electron, and ion spectroscopies. Computer-based homework problems.

MatS 5531. Electrochemical Engineering. (3 cr. Prereq–MatS 3011 or #, upper div IT or grad)
Fundamentals of electrochemical engineering. Topics include electrochemical mass transfer electrokinetics, thermodynamics of cells, modern sensors, formation of thin films and microstructured materials. Computer-based problems will be assigned.

Mathematics (Math)

School of Mathematics

Institute of Technology

Math 1001. Excursions in Mathematics. (3 cr. Prereq–3 yrs high school math or placement exam or grade of at least C- in GC 0731)
Breadth of mathematics, its nature/applications. Power of abstract reasoning.

Math 1008. Trigonometry. (3 cr; A-F only. Prereq–Plane geometry, two yrs high school algebra or [C or better in GC 0731]])
Analytic trigonometry, identities, equations, properties of trigometric functions, right/oblique triangles.

Math 1031. College Algebra and Probability. (3 cr. §1051, §1151, §1155. Prereq–3 yrs high school math or grade of at least C- in GC 0731)
Algebra, analytic geometry explored in greater depth than is usually done in three years of high school mathematics. Additional topics from combinations, permutations, probability.

Math 1038. College Algebra and Probability Submodule. (1 cr; A-F only. §1031. Prereq–1051 or 1151 or 1155)
For students who need probability/permutations/combinations portion of 1031. Meets with 1031, has same grade/work requirements.

Math 1051. Precalculus I. (3 cr. §1031, §1151. Prereq–3 yrs high school math or placement exam or grade of at least C- in GC 0731)
Algebra, analytic geometry, exponentials, logarithms, beyond usual coverage found in three-year high school mathematics program.

Math 1131. Finite Mathematics. (3 cr. Prereq–3 1/2 yrs high school math or grade of at least C- in [1031 or 1051])
Financial mathematics, probability, linear algebra, linear programming, Markov chains, some elementary computer programming.

Math 1142. Short Calculus. (4 cr. §1271, §1281, §1371, §1571. Prereq–3 1/2 yrs high school math or grade of at least C- in [1031 or 1051])
Derivatives, integrals, differential equations, partial derivatives, maxima/minima of functions of several variables covered with less depth than full calculus. No trigonometry included.

Math 1143. Introduction to Advanced Mathematics. (4 cr; A-F only. Prereq–1142 or 1272 or 1372 or #; recommended especially for students in [social/biological sciences, business])
Topics that are covered in more depth in 2243 and 2263, plus probability theory. Matrices, eigenvectors, conditional probability, independence, distributions, basic statistical tools, linear regression. Linear differential equations and systems of differential equations. Multivariable differentiability and linearization.

Math 1151. Precalculus II. (3 cr. §1155. Prereq–3 1/2 yrs high school math or placement exam or grade of at least C- in [1031 or 1051])
Algebra, analytic geometry, trigonometry, complex numbers, beyond usual coverage found in three-year high school mathematics program.

Math 1155. Intensive Precalculus. (5 cr. §1031, §1051, §1151. Prereq–3 yrs high school math or placement exam or grade of at least C- in GC 0731)
Algebra, analytic geometry, exponentials, logarithms, trigonometry, complex numbers, beyond usual coverage found in three-year high school mathematics program. One semester version of 1051-1151.

Math 1271. Calculus I. (4 cr. §1142, §1371, §1571. Prereq–4 yrs high school math including trig or placement test or grade of at least C- in 1151 or 1155)
Differential calculus of functions of a single variable. Introduction to integral calculus of a single variable, separable differential equations. Applications: max-min, related rates, area, volume, arc-length.

Math 1272. Calculus II. (4 cr. §1372, §1572. Prereq–[1271 or equiv] with grade of at least C-)
Techniques of integration. Calculus involving transcendental functions, polar coordinates. Taylor polynomials, vectors/curves in space, cylindrical/spherical coordinates.

Math 1281. Calculus With Biological Emphasis I. (4 cr; A-F only. §1142, §1271, §1371, §1571. Prereq–[[four yrs high school math including trigonometry] or [grade of at least C- in [1151 or 1155]] or placement exam], [# or ❑]])
Differential calculus of single-variable functions, basics of integral calculus. Applications emphasizing biological sciences.

Math 1282. Calculus With Biological Emphasis II. (4 cr; A-F only. §1372, §1272, §1572. Prereq–[[1271 or 1281 or 1371] with grade of at least C-], [# or ❑])
Techniques/applications of integration, differential equations/systems, matrix algebra, basics of multivariable calculus. Applications emphasizing biology.

Math 1371. IT Calculus I. (4 cr. §1271, §1571. Prereq–IT, background in [precalculus, geometry, visualization of functions/graphs], #; familiarity with graphing calculators recommended)
Differentiation of single-variable functions, basics of integration of single-variable functions. Applications: max-min, related rates, area, curve-sketching. Emphasizes use of calculator, cooperative learning.

Math 1372. IT Calculus II. (4 cr. §1272, §1282, §1572. Prereq–IT, grade of at least C- in 1371)
Techniques of integration. Calculus involving transcendental functions, polar coordinates, Taylor polynomials, vectors/curves in space, cylindrical/spherical coordinates. Emphasizes use of calculators, cooperative learning.

Math 1471H. Honors Calculus I for Secondary Students. (5 cr. Prereq–High school student, #)
Differentiation/integration of single-variable functions. Emphasizes concepts/explorations.

Math 1472H. Honors Calculus II for Secondary Students. (5 cr. Prereq–1471H)
Sequences/series, vector functions, differentiation in multivariable calculus. Introduction to first-order systems of differential equations. Emphasizes concepts/explorations.

Math 1473H. Honors Calculus IIA for Secondary Students. (2 cr)
Accelerated honors sequence for selected mathematically talented high school students. Introduction to linear methods and first order differential equations.

Math 1474H. Honors Calculus IIB for Secondary Students. (3 cr. Prereq–Honors)
Accelerated honors sequence for selected mathematically talented high school students. Multivariable calculus through differentiation. Focuses on proofs and formal reasoning.

Math 1571H. Honors Calculus I. (4 cr. §1271, §1371. Prereq–IT Honors office approval)
Differential/integral calculus of functions of a single variable. Emphasizes hard problem-solving rather than theory.

Math 1572H. Honors Calculus II. (4 cr. Prereq–Grade of at least C- in 1571, IT Honors Office approval; parts of this sequence may be taken for cr by students who have taken non-honors calc classes)
Continuation of 1571. Infinite series, differential calculus of several variables, introduction to linear algebra.

Math 2001. Actuarial Science Seminar. (1 cr; S-N only. Prereq–1272 or equiv)
Actuarial science as a subject and career. Guest lectures by actuaries. Resume preparation and interviewing skills. Review and practice for actuarial exams.

Math 2243. Linear Algebra and Differential Equations. (4 cr. §2373, §2573. Prereq–1272 or 1282 or 1372 or 1572)
Linear algebra: basis, dimension, matrices, eigenvalues/eigenvectors. Differential equations: first-order linear, separable; second-order linear with constant coefficients; linear systems with constant coefficients.

Math 2263. Multivariable Calculus. (4 cr. §2374, §2573. Prereq–1272 or 1372 or 1572)
Derivative as a linear map. Differential/integral calculus of functions of several variables, including change of coordinates using Jacobians. Line/surface integrals. Gauss, Green, Stokes theorems.

Math 2283. Sequences, Series, and Foundations. (3 cr. §3283. Prereq–¶[2243 or 2263 or 2373 or 2374])
Introduction to mathematical reasoning used in advanced mathematics. Elements of logic. Mathematical induction. Real number system. General, monotone, recursively defined sequences. Convergence of infinite series/sequences. Taylor's series. Power series with applications to differential equations. Newton's method.

Math 2373. IT Linear Algebra and Differential Equations. (4 cr. §2243, §2573. Prereq–[1272 or 1282 or 1372 or 1572], IT)
Linear algebra: basis, dimension, eigenvalues/eigenvectors. Differential Equations: linear equations/systems, phase space, forcing/resonance, qualitative/numerical analysis of nonlinear systems, Laplace transforms. Emphasizes use of computer technology.

Math 2374. IT Multivariable Calculus and Vector Analysis. (4 cr. §2263. Prereq–[1272 or 1282 or 1372 or 1572], IT)
Derivative as a linear map. Differential/integral calculus of functions of several variables, including change of coordinates using Jacobians. Line/surface integrals. Gauss, Green, Stokes theorems. Emphasizes use of computer technology.

Math 2473H. Honors Calculus III for Secondary Students. (3 cr. Prereq–1472H)
Multivariable integration, vector analysis, nonhomogeneous linear equations, nonlinear systems of equations. Emphasizes concepts/explorations.

Math 2474H. Advanced Topics for Secondary Students. (3 cr. Prereq–2473H)
Topics may include linear algebra, combinatorics, advanced differential equations, probability/statistics, numerical analysis, dynamical systems, topology/geometry. Emphasizes concepts/explorations.

Math 2573H. Honors Calculus III. (4 cr. Prereq–1572 or IT Honors office approval)
Integral calculus of several variables. Vector analysis, including theorems of Gauss, Green, Stokes.

Math 2574H. Honors Mathematics IV. (4 cr. Prereq–[2573 or equiv], IT Honors office approval)
Advanced linear algebra, differential equations. Additional topics as time permits.

Math 3113. Topics in Elementary Mathematics I. (4 cr. Prereq–[Grade of at least C- in 1031] or placement exam)
Arithmetic/geometric sequences. Counting, building on techniques from college algebra. Graph theory. Integers, rational numbers; emphasizes aspects related to prime factorization. Modular arithmetic with applications.

Math 3116. Topics in Elementary Math II: Short Course. (2 cr; A-F only. Prereq–Grade of at least C- in 3113)
Probability/Statistics, vector geometry, real/complex numbers. Meets during first half of semester only.

Math 3118. Topics in Elementary Mathematics II. (4 cr. Prereq–Grade of at least C- in 3113)
Probability/statistics, vector geometry, real/complex numbers, finite fields building on previously learned modular arithmetic, trees.

Math 3283W. Sequences, Series, and Foundations: Writing Intensive. (4 cr. §2283. Prereq–¶[2243 or 2263 or 2373 or 2374])
Introduction to reasoning used in advanced mathematics courses. Logic, mathematical induction, real number system, general/monotone/recursively defined sequences, convergence of infinite series/sequences, Taylor's series, power series with applications to differential equations, Newton's method. Writing-intensive component.

Math 3574H. Honors Mathematics IV (Advanced Placement). (5 cr. Prereq–[2573 or equiv], IT Honors office approval)
Advanced linear algebra, differential equations. Introduction to complex analysis.

Math 4065. Theory of Interest. (3 cr. Prereq–1272 or 1372 or 1572; primarily for [mathematics, business] majors interested in actuarial science)
Time value of money. Annuities, sinking funds, bonds, similar items.

Math 4113. Topics in Elementary Mathematics I. (4 cr. Prereq–[Grade of at least C- in 1031] or placement exam)
Arithmetic/geometric sequences. Counting, building on techniques from college algebra. Graph Theory. Integers, rational numbers; emphasizes aspects related to prime factorization. Modular arithmetic with applications. Grading standard one-third higher than 3113.

Math 4116. Topics in Elementary Math II: Short Course. (2 cr; A-F only. Prereq–Grade of at least C- in 4113)
Probability/Statistics, vector geometry, real/complex numbers. Meets during first half of semester only. Grading standard one-third higher than 3116.

Math 4118. Topics in Elementary Mathematics II. (4 cr. Prereq–Grade of at least C- in 4113)
Probability/statistics, vector geometry, real/complex numbers, finite fields building on previously learned modular arithmetic, trees. Grading standard one-third higher than 3118.

Math 4151. Elementary Set Theory. (3 cr. Prereq–One soph math course or #)
Basic properties of operations on sets, cardinal numbers, simply and well-ordered sets, ordinal numbers, axiom of choice, axiomatics.

Math 4152. Elementary Mathematical Logic. (3 cr. §5166. Prereq–One soph math course or #)
Propositional logic. Predicate logic: notion of a first order language, a deductive system for first order logic, first order structures, Godel's completeness theorem, axiom systems, models of formal theories.

Math 4242. Applied Linear Algebra. (4 cr. Prereq–2243 or 2373 or 2573)
Systems of linear equations, vector spaces, subspaces, bases, linear transformations, matrices, determinants, eigenvalues, canonical forms, quadratic forms, applications.

Math 4428. Mathematical Modeling. (4 cr. Prereq–2243 or 2373 or 2573)
Modeling techniques for analysis/decision-making in industry. Optimization (sensitivity analysis, Lagrange multipliers, linear programming). Dynamical modeling (steady-states, stability analysis, eigenvalue methods, phase portraits, simulation). Probabilistic methods (probability/statistical models, Markov chains, linear regression, simulation).

Math 4457. Methods of Applied Mathematics I. (4 cr. Prereq–[2243 or 2373 or 2573], [2263 or 2374 or 2574])
Vector spaces, minimization principles, least squares approximation, orthogonal bases, linear functions, linear systems of ordinary differential equations. Applications include statics/dynamics of electrical circuits, mechanical structures. Stability/resonance, approximation/interpolation of data. Numerical methods and geometry.

Math 4458. Methods of Applied Mathematics II. (4 cr. Prereq–4457)
Boundary value problems, partial differential equations, complex variables, dynamical systems, calculus of variations, numerical methods. Green's functions, delta functions, Fourier series/integrals, wavelets, conformal mapping, finite elements/differences. Applications: fluid/continuum mechanics, heat flow, signal processing, quantum mechanics.

Math 4512. Differential Equations with Applications. (3 cr. Prereq–2243 or 2373 or 2573)
Laplace transforms, series solutions, systems, numerical methods, plane autonomous systems, stability.

Math 4567. Introduction to Fourier Analysis. (4 cr. Prereq–2243 or 2373 or 2573)
Fourier series, integral and transform. Convergence. Fourier series, transform in complex form. Solution of wave, heat, Laplace equations by separation of variables. Sturm-Liouville systems, finite Fourier, fast Fourier transform. Applications. Other topics as time permits.

Math 4606. Advanced Calculus. (4 cr. Prereq–[2263 or 2374 or 2573], [2283 or 2574 or 3283 or #])
Axioms for the real numbers. Techniques of proof for limit theorems, continuity, uniform convergence. Rigorous treatment of differential/integral calculus for single-/multi-variable functions.

Math 4707. Introduction to Combinatorics and Graph Theory. (4 cr; A-F only. §5705, §5707. Prereq–2243, [2283 or 3283])
Existence, enumeration, construction, algorithms, optimization. Pigeonhole principle, bijective combinatorics, inclusion-exclusion, recursions, graph modeling, isomorphism. Degree sequences and edge counting. Connectivity, Eulerian graphs, trees, Euler's formula, network flows, matching theory. Emphasizes mathematical induction as proof technique.

Math 4990. Topics in Mathematics. (1-4 cr [max 12 cr]. Prereq–#)

Math 4991. Independent Study. (1-4 cr [max 12 cr]. Prereq–#)

Math 4992. Directed Reading. (1-4 cr [max 12 cr]. Prereq–#)

Math 4993. Directed Study. (1-4 cr [max 12 cr]. Prereq–#)

Math 4995. Senior Project for CLA. (1 cr; A-F only. Prereq–2 sem of upper div math)
Directed study. May consist of paper on specialized area of math or original computer program or other approved project. Covers some math that is new to student. Scope/topic vary with instructor.

Math 4997W. Senior project (Writing Intensive). (1 cr; A-F only. Prereq–[2 sem upper div math, CLA math major] or #)
Directed study. A 10-15 page paper on a specialized area, including some math that is new to student. At least two drafts of paper given to instructor for feedback before final version. Student keeps journal of preliminary work on project. Scope/topic vary with instructor.

Math 5067. Actuarial Mathematics I. (4 cr. Prereq–4065, [one sem [4xxx or 5xxx] [probability or statistics] course])
Future lifetime random variable, survival function. Insurance, life annuity, future loss random variables. Net single premium, actuarial present value, net premium, net reserves.

Math 5068. Actuarial Mathematics II. (4 cr. Prereq–5067)
Multiple decrement insurance, pension valuation. Expense analysis, gross premium, reserves. Problem of withdrawals. Regulatory reserving systems. Minimum cash values. Additional topics at instructor's discretion.

Math 5075. Mathematics of Options, Futures, and Derivative Securities I. (4 cr; A-F only. Prereq–Two yrs calculus, basic computer skills)
Mathematical background (e.g., partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods—including Monte Carlo simulation). Interest-rate derivative securities, exotic options, risk theory. First course of two-course sequence.

Math 5076. Mathematics of Options, Futures, and Derivative Securities II. (4 cr; A-F only. Prereq–5075)
Mathematical background such as partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods (including Monte Carlo simulation), interest-rate derivative securities, exotic options, risk theory.

Math 5165. Mathematical Logic I. (4 cr. Prereq–2283 or 3283 or Phil 5201 or CSci course in theory of algorithms or #)
Theory of computability: notion of algorithm, Turing machines, primitive recursive functions, recursive functions, Kleene normal form, recursion theorem. Propositional logic.

Math 5166. Mathematical Logic II. (4 cr. Prereq–5165)
First-order logic: provability/truth in formal systems, models of axiom systems, Godel's completeness theorem. Godel's incompleteness theorem: decidable theories, representability of recursive functions in formal theories, undecidable theories, models of arithmetic.

Math 5248. Cryptology and Number Theory. (4 cr. Prereq–Soph math course)
Classical cryptosystems. One-time pads, perfect secrecy. Public key ciphers: RSA, discrete log. Euclidean algorithm, finite fields, quadratic reciprocity. Message digest, hash functions. Protocols: key exchange, secret sharing, zero-knowledge proofs. Probablistic algorithms: pseudoprimes, prime factorization. Pseudo-random numbers. Elliptic curves.

Math 5251. Error-Correcting Codes, Finite Fields, Algebraic Curves. (4 cr. Prereq–Soph math course)
Information theory: channel models, transmission errors. Hamming weight and distance. Linear codes and fields, check bits. Error processing: linear codes, Hamming codes, binary Golay codes. Euclidean algorithm. Finite fields, Bose-Chaudhuri-Hocquenghem codes, polynomial codes, Goppa codes, codes from algebraic curves.

Math 5285H. Honors: Fundamental Structures of Algebra I. (4 cr. Prereq–[2243 or 2373 or 2573], [2283 or 2574 or 3283])
Review of matrix theory, linear algebra. Vector spaces, linear transformations over abstract fields. Group theory, including normal subgroups, quotient groups, homomorphisms, class equation, Sylow's theorems. Specific examples: permutation groups, symmetry groups of geometric figures, matrix groups.

Math 5286H. Honors: Fundamental Structures of Algebra II. (4 cr. Prereq–5285)
Ring/module theory, including ideals, quotients, homomorphisms, domains (unique factorization, euclidean, principal ideal), fundamental theorem for finitely generated modules over euclidean domains, Jordan canonical form. Introduction to field theory, including finite fields, algebraic/transcendental extensions, Galois theory.

Math 5335. Geometry I. (4 cr. Prereq–[2243 or 2373 or 2573], [¶2263 or ¶2374 or ¶2574])
Advanced two-dimensional Euclidean geometry from a vector viewpoint. Theorems/problems about triangles/circles, isometries, connections with Euclid's axioms. Hyperbolic geometry, how it compares with Euclidean geometry.

Math 5336. Geometry II. (4 cr. Prereq–5335)
Projective geometry, including: relation to Euclidean geometry, finite geometries, fundamental theorem of projective geometry. N-dimensionalEuclidean geometry from a vector viewpoint. Emphasizes N=3, including: polyhedra, spheres, isometries.

Math 5345. Introduction to Topology. (4 cr. Prereq–[2263 or 2374 or 2573], [¶2283 or ¶2574 or ¶3283])
Set theory. Euclidean/metric spaces. Basics of general topology, including compactness/connectedness.

Math 5378. Differential Geometry. (4 cr. Prereq–[2263 or 2374 or 2573], [2283 or 2574 or 3283 or 5345])
Basic geometry of curves in plane and in space, including Frenet formula, theory of surfaces, differential forms, Riemannian geometry.

Math 5385. Introduction to Computational Algebraic Geometry. (4 cr. Prereq–2263 or 2374 or 2573)
Geometry of curves/surfaces defined by polynomial equations. Emphasizes concrete computations with polynomials using computer packages, interplay between algebra and geometry. Abstract algebra presented as needed.

Math 5467. Introduction to the Mathematics of Wavelets. (3 cr. Prereq–[2243 or 2373 or 2573], [2283 or 2574 or 3283 or #]; [[2263 or 2374], 4567] recommended)
Background theory/experience in wavelets. Inner product spaces, operator theory, Fourier transforms applied to Gabor transforms, multi-scale analysis, discrete wavelets, self-similarity. Computing techniques.

Math 5481. Mathematics of Industrial Problems I. (4 cr. Prereq–[2243 or 2373 or 2573], [2263 or 2374 or 2574], familiarity with some programming language)
Topics in industrial math, including crystal precipitation, air quality modeling, electron beam lithography. Problems treated both theoretically and numerically.

Math 5482. Mathematics of Industrial Problems II. (4 cr. Prereq–[2243 or 2373 or 2573], [2263 or 2374 or 2574], familiarity with some programming language)
Topics in industrial math, including color photography, catalytic converters, photocopying.

Math 5485. Introduction to Numerical Methods I. (4 cr. Prereq–2243 or 2373 or 2573; some computer skills recommended)
Solution of nonlinear equations in one variable. Interpolation, polynomial approximation, numerical integration/differentiation, numerical solution of initial-value problems.

Math 5486. Introduction To Numerical Methods II. (4 cr. Prereq–5485)
Direct/iterative methods for solving linear systems, approximation theory, methods for eigenvalue problems, methods for systems of nonlinear equations, numerical solution of boundary value problems for ordinary differential equations.

Math 5487. Computational Methods for Differential and Integral Equations in Engineering and Science I. (4 cr. Prereq–4242)
Numerical methods for elliptic partial differential equations, integral equations of engineering and science. Methods include finite element, finite difference, spectral, boundary integral.

Math 5488. Computational Methods for Differential and Integral Equations in Engineering and Science II. (4 cr. Prereq–5487)
Numerical methods for time-dependent partial differential equations of engineering/science. Methods include finite element, finite difference, spectral, boundary integral. Applications to fluid flow, elasticity, electromagnetism.

Math 5525. Introduction to Ordinary Differential Equations. (4 cr. Prereq–[2243 or 2373 or 2573], [2283 or 2574 or 3283])
Ordinary differential equations, solution of linear systems, qualitative/numerical methods for nonlinear systems. Linear algebra background, fundamental matrix solutions, variation of parameters, existence/uniqueness theorems, phase space. Rest points, their stability. Periodic orbits, Poincare-Bendixson theory, strange attractors.

Math 5535. Dynamical Systems and Chaos. (4 cr. Prereq–[2243 or 2373 or 2573], [2263 or 2374 or 2574])
Dynamical systems theory. Emphasizes iteration of one-dimensional mappings. Fixed points, periodic points, stability, bifurcations, symbolic dynamics, chaos, fractals, Julia/Mandelbrot sets.

Math 5583. Complex Analysis. (4 cr. Prereq–2263 or 2374 or 2573)
Algebra, geometry of complex numbers. Linear fractional transformations. Conformal mappings. Holomorphic functions. Theorems of Abel/Cauchy, power series. Schwarz' lemma. Complex exponential, trig functions. Entire functions, theorems of Liouville/Morera. Reflection principle. Singularities, Laurent series. Residues.

Math 5587. Elementary Partial Differential Equations I. (4 cr. Prereq–[2243 or 2373 or 2573], [2263 or 2374 or 2574])
Emphasizes partial differential equations w/physical applications, including heat, wave, Laplace's equations. Interpretations of boundary conditions. Characteristics, Fourier series, transforms, Green's functions, images, computational methods. Applications include wave propagation, diffusions, electrostatics, shocks.

Math 5588. Elementary Partial Differential Equations II. (4 cr; A-F only. Prereq–[2243 or 2373 or 2573], [2263 or 2374 or 2574]; 5587 not a prereq but see instructor)
Heat, wave, Laplace's equations in higher dimensions. Green's functions, Fourier series, transforms. Asymptotic methods, boundary layer theory, bifurcation theory for linear/nonlinear PDEs. Variational methods. Free boundary problems. Additional topics as time permits.

Math 5615H. Honors: Introduction to Analysis I. (4 cr. Prereq–[[2243 or 2373], [2263 or 2374], [2283 or 3283]] or 2574)
Axiomatic treatment of real/complex number systems. Introduction to metric spaces: convergence, connectedness, compactness. Convergence of sequences/series of real/complex numbers, Cauchy criterion, root/ratio tests. Continuity in metric spaces. Rigorous treatment of differentiation of single-variable functions, Taylor's Theorem.

Math 5616H. Honors: Introduction to Analysis II. (4 cr. Prereq–5615)
Rigorous treatment of Riemann-Stieltjes integration. Sequences/series of functions, uniform convergence, equicontinuous families, Stone-Weierstrass Theorem, power series. Rigorous treatment of differentiation/integration of multivariable functions, Implicit Function Theorem, Stokes Theorem. Additional topics as time permits.

Math 5651. Basic Theory of Probability and Statistics. (4 cr. §Stat 5101. Prereq–[2263 or 2374 or 2573]; [[2243 or 2373], [2283 or 2574 or 3283]] recommended)
Logical development of probability, basic issues in statistics. Probability spaces, random variables, their distributions/expected values. Law of large numbers, central limit theorem, generating functions, sampling, sufficiency, estimation.

Math 5652. Introduction to Stochastic Processes. (4 cr. Prereq–[2243 or 2373 or 2573], [5651 or Stat 5101])
Random walks, Markov chains, branching processes, martingales, queuing theory, Brownian motion.

Math 5654. Prediction and Filtering. (4 cr. Prereq–[2243 or 2373 or 2573], [5651 or Stat 5101])
Markov chains, Wiener process, stationary sequences, Ornstein-Uhlenbeck process. Partially observable Markov processes (hidden Markov models), stationary processes. Equations for general filters, Kalman filter. Prediction of future values of partially observable processes.

Math 5705. Enumerative Combinatorics. (4 cr. Prereq–[2243 or 2373 or 2573], [2263 or 2283 or 2374 or 2574 or 3283])
Basic enumeration, bijections, inclusion-exclusion, recurrence relations, ordinary/exponential generating functions, partitions, Polya theory. Optional topics include trees, asymptotics, listing algorithms, rook theory, involutions, tableaux, permutation statistics.

Math 5707. Graph Theory and Non-enumerative Combinatorics. (4 cr. Prereq–[2243 or 2373 or 2573], [2263 or 2374 or 2574]; [2283 or 3283 or experience in writing proofs] highly recommended)
Basic topics in graph theory: connectedness, Eulerian/Hamiltonian properties, trees, colorings, planar graphs, matchings, flows in networks. Optional topics include graph algorithms, Latin squares, block designs, Ramsey theory.

Math 5711. Linear Programming and Combinatorial Optimization. (4 cr. Prereq–2243 or 2373 or 2573)
Simplex method, connections to geometry, duality theory, sensitivity analysis. Applications to cutting stock, allocation of resources, scheduling problems. Flows, matching/transportation problems, spanning trees, distance in graphs, integer programs, branch/bound, cutting planes, heuristics. Applications to traveling salesman, knapsack problems.

Math 5900. Tutorial in Advanced Mathematics. (1-6 cr [max 120 cr]; A-F only)
Individually directed study.

Mechanical Engineering (ME)

Department of Mechanical Engineering

Institute of Technology

ME 2011. Introduction to Engineering. (4 cr; A-F only. Prereq–IT lower div)
Develop skills critical for practicing engineers. Core disciplinary areas of mechanical engineering and engineering design. Extensive exposure to visual, written and oral communication forms, and to computer-based design tools. Substantial design projects, including prototype construction.

ME 3031. Basic Mechanical Measurements Laboratory. (4 cr; A-F only. Prereq–3321, ¶3322, IE 4521, upper div ME)
Experimental methods, instrumentation for engineering measurements, statistical estimates of experimental uncertainty, calibration, signal conditioning, selected transducers for mechanical measurements, data acquisition/processing, presentation of results. Measurement of temperature, pressure, humidity, stress-strain, force, velocity, and flow/radiative properties.

ME 3041. Industrial Assignment I. (2 cr; A-F only. Prereq–ME upper div, regis in ME co-op program)
Industrial work assignment in engineering intern program. Evaluation based on student's formal written report covering the semester's work assignment.

ME 3221. Design and Manufacturing I: Engineering Materials and Manufacturing Processes. (4 cr; A-F only. Prereq–ME upper div, 2011, AEM 3031, CSci 1113, MatS 2001)
Material behavior and failure in design and manufacturing. Models for material removal, bulk deformation, sheet metal forming, and consolidation processes. Characterization of process capabilities and parts.

ME 3222. Design and Manufacturing II. (4 cr; A-F only. Prereq–Upper div ME student, 3221, CSci 1113 or equiv)
Selection of standard mechanical components such as bearings, gears, and fasteners. Analysis and synthesis of motion in machines. Displacement, velocity, and acceleration of mechanisms. Machine design project: apply lecture topics to develop new machines that fulfill customer specifications.

ME 3281. System Dynamics and Control. (4 cr; A-F only. Prereq–ME upper div, AEM 2021, CSci 1113)
Dynamics of mechanical, electrical, thermal, fluid, and hybrid systems. System response using Laplace transform and numerical integration. Fourier transform and convolution. Transfer functions and frequency response. Introduction to classical control.

ME 3321. Thermodynamics. (4 cr; A-F only. Prereq–Chem 1021, Math 2243, Phys 1301, IT student, [wood and paper science or paper science engineering] major)
Properties, equations of state, processes, cycles for reversible/irreversible thermodynamic systems. Modes of work/heat transfer. Equations for conservation of mass, linear momentum, energy, entropy. Mixture properties, thermochemistry, chemical equilibrium for ideal gases.

ME 3322. Heat Transfer and Fluid Flow. (4 cr; A-F only. Prereq–ME upper div, wood/paper sci, 3321)
Mechanisms of heat transfer: conduction, radiation, convection, phase change. Fluid flow: mass/momentum conservation laws, statics, inviscid model, Bernoulli's equation. Convection: external/internal flows, heat transfer coefficient, forced/natural convection, heat exchangers. Phase change: boiling/condensation.

ME 3324. Introduction to Thermal Science. (4 cr; A-F only. Prereq–Chem 1021, Math 2243, Phys 1301, [IT student or COAFES pre-BAE major])
Thermodynamics, heat transfer. Thermal properties of substances. First/second laws of thermodynamics. Steady/unsteady heat conduction. Thermal resistance concept. Convection heat transfer. Radiative heat transfer between solid surfaces. Boiling/condensation heat transfer.

ME 4042. Industrial Assignment II. (2 cr; A-F only. Prereq–ME upper div, regis in ME Co-op program)
Industrial work assignment in engineering intern program. Evaluation based on student's formal written report covering the quarter's work assignment.

ME 4043W. Industrial Assignment III. (4 cr; A-F only. Prereq–4042)
Solution of system design problems that require developing criteria, evaluating alternatives, and generating a preliminary design. Final report emphasizes design communication and describes design decision process, analysis, and final recommendations.

ME 4054W. Design Projects. (4 cr; A-F only. Prereq–2011, 3031, 3221, 3223, 3321, 3322, AEM 2021, AEM 3031,)
Students work in teams and undertake a single, substantial design project. Design problems are open-ended. Lecture covers good product design process. Teams give formal presentation of progress at mid-semester design review and show completed work at the design show.

ME 4055W. Extended Design Project. (4 cr; A-F only. Prereq–4054, #)
Continuation of 4054 for students wishing to undertake a more substantial design project for an entire year. Permission granted when student takes 4054 and commits to undertake a two-semester design project. Meets with 4054.

ME 4081H. Mechanical Engineering Honors Thesis I. (2 cr; A-F only. Prereq–Upper div ME honors student, #)
Unstructured research course enabling honors students to do independent research supervised by faculty. Selection of suitable topics according to individual interests and faculty approval. Thesis and oral defense.

ME 4082H. Mechanical Engineering Honors Thesis II. (2 cr; A-F only. Prereq–Upper div ME honors student, #)
Unstructured research course enabling honors students to do independent research supervised by faculty. Selection of suitable topics according to individual interests and faculty approval. Thesis and oral defense.

ME 4131W. Thermal Environmental Engineering Laboratory. (4 cr; A-F only. Prereq–ME upper div or grad student, 3322 or 3233)
Experiments in psychrometrics, refrigeration, air conditioning, solar energy, indoor air quality, and other topics related to refrigeration, building heating and cooling, and indoor air quality.

ME 4231. Motion Control Laboratory. (4 cr; A-F only. Prereq–3031, 3281, ME upper div)
Microprocessor programming, digital filters, frequency response testing, modeling of eletromechanical systems, closed loop velocity and position control, programmable logic controllers, factory automation, open loop position control of a vibratory system using input shaping, closed loop position control using pole placement.

ME 4232. Fluid Power Control Lab. (4 cr; A-F only. Prereq–3031, 3281, ME upper div)
Fluid power fundamentals. Description/operation of components. Fluid power symbols/circuits. Component sizing. Modeling/simulation, system identification, controller design/implementation. Connecting/making measurements on hydraulic circuits. Lab.

ME 4331W. Thermal Engineering Laboratory. (4 cr; A-F only. Prereq–IT upper div or grad student, 3031, 3321, 3322)
Measurement and analysis of heat transfer in single phase, multiphase, and reacting environments. Emphasis on experimental measurements relevant to thermal/fluid systems as well as the statistical design of experiments and uncertainty analysis. Heat exchange.

ME 4431W. Energy Conversion Systems Laboratory. (4 cr; A-F only. Prereq–Upper div ME or grad student, C grade or better in 3031, 3321, 3322 or 3324 with #)
Senior lab in which material from courses is applied to analyze the operation and control of engines, power plants, heating and ventilation systems. Emphasis on principles underlying performance characteristics of devices, measurement techniques, interpretation of experimental data, and presentation of results.

ME 5080. Topics in Mechanical Engineering. (4 cr. Prereq–Upper div IT or grad student, submission of permission form, #)
Topics vary each semester.

ME 5090. Advanced Engineering Problems. (1-4 cr. Prereq–ME upper div, #)
Special investigations in various fields of mechanical engineering and related areas including an independent study project.

ME 5101. Vapor Cycle Systems. (4 cr; A-F only. Prereq–IT upper div or grad student)
Vapor compression and absorption refrigeration systems; heat pumps; vapor power cycle analysis, regeneration, reheat, compound cycle modifications, combines gas turbine—vapor cycle systems.

ME 5103. Thermal Environmental Engineering. (4 cr; A-F only. Prereq–IT upper div or grad, 3322 or 3323)
Thermodynamic properties of moist air; psychrometric charts; HVAC systems; solar energy; human thermal comfort; indoor air quality; heating and cooling loads in buildings.

ME 5105. HVAC System Design. (4 cr; A-F only. Prereq–IT upper div or grad student, 3322 or 3323)
Design procedures used for heat exchangers, cooling towers, hydronic systems, and air handling systems. HVAC system design for a commercial building.

ME 5113. Aerosol/Particle Engineering. (4 cr; A-F only. Prereq–IT upper div or grad student)
Kinetic theory, definition, theory and measurement of particle properties, elementary particle mechanics, particle statistics; Brownian motion and diffusion, coagulation, evaporation and condensation, sampling and transport.

ME 5115. Air Quality and Air Pollution Control. (4 cr; A-F only. Prereq–IT upper div or grad student)
Air pollution sources, atmospheric transport, transformations, fate, and emissions control. Air pollution meteorology, dispersion, chemistry of secondary pollutant formation, standards and regulation. Control devices and techniques for gaseous and particulate emissions. Cyclones, electrostatic precipitators, wet and dry scrubbers, combustion modification.

ME 5116. Cleanroom Technology and Particle Monitoring. (4 cr; A-F only. Prereq–IT upper div or grad student)
Fundamentals of cleanroom technology for microelectronics manufacturing; airborne and liquid-borne particulate contaminants; particle monitors: optical and condensation particle counters, wafer surface scanner, microscopy; filter performance and testing; cleanroom design and operation; high purity systems; particle detection in processing equipment.

ME 5133. Aerosol Measurement Laboratory. (4 cr; A-F only. Prereq–IT upper div or graduate student)
Principles of aerosol measurement. Single particle analysis by optical and electron microscopy. Aerosol samplers and inertial collectors. Integral mass concentration and number concentration detectors. Size distribution by laser particle counter and differential mobility particle sizer. Aerosol generation and instrument calibration.

ME 5221. Computer-Assisted Product Realization. (4 cr; A-F only. Prereq–3221, AEM 3031, CSci 1113, MatS 2001)
Injection molding with emphasis on design of manufacturing processes. Tooling design and specification of processing conditions using computer-based tools; process simulation software and computer-controlled machine tools. Simultaneous process and part design. Production of tooling and parts. Part evaluation.

ME 5223. Materials in Design. (4 cr. Prereq–3221)
Fundamental properties of engineering materials. Fabrication, treatment. Physical and corrosive properties. Failure mechanism, cost and value analysis as related to material selection and specification.

ME 5228. Introduction to Finite Element Modeling, Analysis, and Design. (4 cr; A-F only. Prereq–IT upper div or grad, 3221, AEM 3031, CSci 1113, MatS 2001)
Finite elements as principal analysis tool in computer-aided design (CAD); theoretical issues and implementation aspects for modeling and analyzing engineering problems encompassing stress analysis, heat transfer, and flow problems for linear situations. One-, two-, and three-dimensional practical engineering applications.

ME 5231. Digital and Analog Control Laboratory. (4 cr; A-F only. Prereq–ME or AEM upper div or grad student, 5281 or equiv)
Lab experiments illustrate and apply control theory to mechanical engineering systems. Emphasis on real-life control design and implementation, including dynamic modeling, controller design, analysis and simulation, hardware implementation, measurement techniques, sensor calibration, data acquisition, and processing.

ME 5241. Computer-Aided Engineering. (4 cr; A-F only. Prereq–IT upper div or grad, 3222, CSci 1113 or equiv)
Apply computer-aided engineering to mechanical design. Engineering design projects and case studies using computer-aided design and finite element analysis software; design optimization and computer graphical presentation of results.

ME 5243. Advanced Mechanism Design. (4 cr; A-F only. Prereq–Upper div IT or grad, 3222 or equiv, basic kinematics and dynamics of machines; knowledge of CAD packages such as Pro-E helpful)
Analytical methods of kinematic, dynamic, and kinetoelastodynamic analysis and synthesis of mechanisms. Computerized design for function, path, and motion generation based on Burmeister theory.

ME 5247. Stress Analysis, Sensing, and Transducers. (4 cr; A-F only. Prereq–AEM 3031, MatS 2001)
Electrical resistance strain gage theory and technology. Gage characteristics, selection, and use. Bridge circuits and temperature and stray strain compensation. Signal conditioning. Data analysis.

Photoelasticity techniques. Interpretation of fringe patterns. Sensor principles and performance. Transducer design and characterization.

ME 5248. Vibration Engineering. (4 cr. Prereq–Upper div IT or grad, 3281)
Apply vibration theory to designimize isolators, detuning mechanisms, viscoelastic suspensions and structures. Use modal analysis methods to describe free vibration of complex systems, relating to both theoretical and test procedures.

ME 5281. Analog and Digital Control. (4 cr. Prereq–3281)
Continuous and discrete time feedback control systems. Frequency response, stability, poles and zeros; transient responses; Nyquist and Bode diagrams; root locus; lead-lag and PID compensators, Nicols-Ziegler design method. Digital implementation aliasing; computer-aided design and analysis of control system.

ME 5286. Robotics. (4 cr; A-F only. Prereq–[3281 or equiv], [upper div ME or AEM or CSci or grad student])
Manipulator forward/inverse kinematics, homogeneous transformations, coordinate frames, Jacobian/velocity control, task primitives/programming, computational issues. Determining path trajectories. Reaction forces, manipulator dynamics/control. Vehicle kinematics, dynamics, and guidance. Lab project demonstrates concepts.

ME 5341. Case Studies in Thermal Engineering and Design. (4 cr; A-F only. Prereq–IT upper div or grad student, 3321, 3322)
Characteristics of applied heat transfer problems: nature of problem specification, incompleteness of needed knowledge base, accuracy issues. Categories of applied heat transfer problems (e.g., materials processing, turbomachinery, cooling of electronic equipment, biomedical thermal therapeutic devices, heat exchangers, HVAC systems).

ME 5344. Thermodynamics of Fluid Flow with Applications. (4 cr; A-F only. Prereq–3321, 3322, [IT upper div or grad student])
Conservation of mass, momentum, and energy for compressible gas flows. Relevant thermodynamic properties. Nozzles, diffusers, thrust producers, shocks. Fluid-wall frictional interactions. Wall heat transfer, internal heat release. Temperature recovery. Mass addition. Chemical thermodynamics/applications.

ME 5348. Heat Transfer in Electronic Equipment. (4 cr. Prereq–Upper div IT or grad student, 3322 or 3324)
Technology trends and packaging needs of microelectronic components; thermal characteristics, heat transfer mechanisms, and thermal failure modes of modern electronic and microelectronic equipment; reliability prediction techniques; thermal stress and strain in layered structures and solder joints.

ME 5351. Computational Heat Transfer. (4 cr; A-F only. Prereq–IT upper div or grad student, 3322)
Numerical solution of heat conduction and analogous physical processes. Develop and use a computer program to solve complex problems involving steady and unsteady heat conduction, flow and heat transfer in ducts, flow in porous media, and other special applications.

ME 5361. Plasma-Aided Manufacturing. (4 cr; A-F only. §EE 5611. Prereq–Upper div IT or grad student, 3321, 3322 or equiv)
Properties of plasmas as a processing medium, process control and system design considerations using specific examples of plasma spray coating, welding, and microelectronics processing.

ME 5381. Biological Transport Processes. (4 cr; A-F only. §ChEn 5753, §BMEn 5310. Prereq–Upper div IT or grad student, transport class [3322 or ChEn 5103] or #)
Fluid, mass, and heat transport in biological systems. Mass transfer across membranes, fluid flow in capillaries, interstitium, veins and arteries. Biotransport issues in single cells and tissues, artificial organs, membrane oxygenators, and drug delivery applications.

ME 5446. Introduction to Combustion. (4 cr; A-F only. Prereq–Upper div IT or grad student, 3321, 3322)
Thermodynamics, kinetics, energy and mass transport, and pollutants in reacting systems. Reactors, laminar and turbulent flames. Ignition, quenching, and flame stability. Diffusion flames. Combustion in reciprocating engines, furnaces, and turbines, with emphasis on internal combustion engine performance and emissions.

ME 5461. Internal Combustion Engines. (4 cr; A-F only. Prereq–IT upper div or grad student, C or better in 3322 or 3324)
Basic spark ignition and diesel engine principles, air, fuel-air and actual engine cycles, cycle modeling, combustion and emissions, knock phenomena, air flow and volumetric efficiency, mixture requirements, ignition requirements and performance. Lectures and complementary labs.

ME 5462. Gas Turbines. (4 cr; A-F only. Prereq–Upper div IT or grad student, 3321, ¶3322)
Gas turbine cycles, regeneration, recuperation, reheat, intercooling, combined cycle plants, and thermochemical regeneration. Axial and radial flow compressors and turbines; combustor designs, energy analysis, emissions, and noise. Turbojet, fanjet, turboprop engine performance. Stationary power plants, vehicular propulsion, hybrid vehicles.

Medical Technology (MedT)

Department of Laboratory Medicine and Pathology

Medical School

MedT 1010. Orientation in Medical Technology. (1 cr; S-N only. Prereq–Fr)
Orientation to the medical technology (clinical laboratory science) profession.

MedT 4064. Introduction to Clinical Immunohematology. (2 cr; A-F only. Prereq–#)
Principles of blood grouping, antibody identification, compatibility testing, serology, and immunology.

MedT 4065. Introduction to Clinical Immunohematology: Laboratory. (2 cr; A-F only. Prereq–#)
Exercises illustrating basic techniques in blood grouping, antibody identification, compatibility testing, and detection of antibodies by serological and immunological methods.

MedT 4082. Applied Clinical Chemistry. (3 cr; S-N only. Prereq–4310, 4311, 4320, 4321)
Application of basic methods and techniques in the clinical chemistry lab.

MedT 4085. Applied Clinical Hematology. (2 cr; S-N only. Prereq–4251, 4252, 4253)
Application of methods and techniques in clinical hematology, morphology, and hemostasis.

MedT 4086. Applied Clinical Immunohematology. (2 cr; S-N only. Prereq–4064, 4065)
Application of basic techniques and methods in blood banking and immunology in the clinical lab. Blood grouping, compatibility testing, and immunologic procedures.

MedT 4088. Applied Diagnostic Microbiology. (2 cr; S-N only. Prereq–4100, 4102)
Isolation, identification, and antimicrobial susceptibility testing of clinically relevant microbes (bacteria, fungi, parasites) from patient specimens.

MedT 4089. Specialty Rotation. (1 cr; S-N only. Prereq–Completion of MedT preclinical professional courses)
One-week clinical rotation in a specialty lab such as immunophenotyping, cytogenetics, surgical pathology, molecular diagnostics, immunology, or forensics.

MedT 4090. Special Laboratory Methods. (1-2 cr. Prereq–#)
Individual assignment to a special area of experience in the clinical lab.

MedT 4092. Honors Program: Laboratory Methods. (3 cr. Prereq–#)
Individual assignment to special projects or research in one of the clinical areas of chemistry, hematology, immunohematology, or microbiology.

MedT 4100. Virology, Mycology, and Parasitology for Medical Technologists. (2 cr; A-F only. Prereq–One microbiology course with lab, one biochem course)
Basic aspects of lab diagnosis of viral, fungal, and parasitic infections. Lecture.

MedT 4104. Principles of Diagnostic Microbiology: Lecture. (2 cr; A-F only. Prereq–One microbiology course with lab, one biochem course)
Current techniques used in lab diagnosis of infectious disease. Isolating/identifying bacteria/yeasts. Antimicrobial susceptibility testing. Lecture.

MedT 4105. Principles of Diagnostic Microbiology: Laboratory. (2 cr; A-F only. Prereq–One microbiology course with lab, one biochem course)
Current techniques used in lab diagnosis of infectious disease. Isolating/identifying bacteria/yeasts. Antimicrobial susceptibility testing. Lab.

MedT 4127W. Introduction to Management and Education I. (1 cr; A-F only. Prereq–#)
Basic concepts in management and education.

MedT 4251. Hematology I: Basic Techniques. (3 cr; A-F only. Prereq–Regis MedT or #)
Theory and application of basic principles and techniques in clinical hematology and hemostasis. Lecture and lab.

MedT 4252. Hematology II: Morphology and Correlation. (2 cr; A-F only. Prereq–4251 or CLS 5251)
Fundamentals of examining blood and bone marrow, emphasizing the microscopic identification of immature and abnormal cells. Clinical correlation of lab findings in hematology and hemostasis. Lecture and lab.

MedT 4253. Hemostasis. (1 cr; A-F only. Prereq–4251 or CLS 5251)
Theory and application of specific concepts and techniques in hemostasis and coagulation. Lecture and lab.

MedT 4263. Comparative Hemostasis. (1 cr; A-F only. Prereq–#)
Theory and application of specific concepts and techniques in hemostasis and coagulation.

MedT 4310. Clinical Chemistry I: Lecture. (2 cr; A-F only. Prereq–One organic chem course with lab, one biochem course, #)
Principles and theory of clinical chemistry to assess renal and metabolic disease/dysfunction, electrolyte balance, and acid-base balance. Introduction to principles and processes for quality management in the clinical lab.

MedT 4311. Clinical Chemistry I: Laboratory. (2 cr; A-F only. Prereq–One organic chem course with lab, one biochem course, #)
Application of clinical chemistry principles and lab techniques in the analysis of urine, plasma, and body fluids. Emphasis on lab tests to evaluate renal function, electrolytes, and acid-base balance. Principles and processes for managing test quality.

MedT 4320. Clinical Chemistry II: Lecture. (2 cr; A-F only. Prereq–One organic chem course with lab, one biochem course, 4310 or CLS 5310, #)
Principles and theory of clinical chemistry to assess metabolic disease/dysfunction involving hormones, enzymes, lipids/lipoproteins, cardiac function, liver and digestive tracts. Emphasis on measurement methods and physiological significance.

MedT 4321. Clinical Chemistry II: Laboratory. (2 cr; A-F only. Prereq–One organic chem course with lab, one biochem course, 4310 or CLS 5310, #)
Application of clinical chemistry principles and lab techniques in the analysis of serum, plasma, and urine. Focus on tests to evaluate selected disorders. Development of lab skills and instrumentation use with emphasis on quality control and technique.

MedT 4400. Immunological and Molecular Basis of Laboratory Testing. (1 cr [max 2 cr]; A-F only. Prereq–BioC 3021, #)
Basic concepts in immunology, cytogenetics, molecular biology, and basic clinical laboratory testing. Lecture.

Medicinal Chemistry (MedC)

Department of Medicinal Chemistry

College of Pharmacy

MedC 5185. Principles of Biomolecular Simulation. (3 cr. Prereq–Chem 3502 or #)
Molecular simulation for students in medicinal chemistry, pharmaceutics, biochemistry, and chemical physics.

MedC 5200. The New Drug Development Process. (1 cr; S-N only)
New drug development process in the U.S. pharmaceutical industry.

MedC 5202. Research and Development Process of Pharmaceutical Products. (2 cr; S-N only)
New drug development process in the U.S. pharmaceutical industry

MedC 5245. Introduction to Drug Design. (3 cr; A-F only. Prereq–Chem)
Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design, mechanism of action drugs.

MedC 5494. Advanced Methods in Quantitative Drug Analysis. (3 cr; A-F only. Prereq–#)
Quantitative methods (HPLC, GC, TLC, and immunoassays) for analysis of drugs and metabolites in biological fluids. Advanced techniques such as capillary electrophoresis, supercritical fluid chromatography, GC-MS, LC-MS, and tandem mass spectrometry. Chromatographic theory and statistical approaches to method validation.

MedC 5495. Vistas in Medicinal Chemistry Research. (1 cr; S-N only)
Selected topics of contemporary interest in medicinal chemistry.

MedC 5600. General Principles of Medicinal Chemistry. (3 cr; A-F only. Prereq–MedC grad student or #)
Fundamental principles of drug receptors as therapeutic targets, drug-receptor interactions, enzyme inhibitors, drug metabolism and disposition.

Medieval Studies (MeSt)

Center for Medieval Studies

College of Liberal Arts

MeSt 1001. The Middle Ages: An Introduction to Medieval Studies. (3 cr)
An introduction to the history, culture, literature, and architecture of the Middle Ages and to interdisciplinary methods of study.

MeSt 3610. Topics in Medieval Studies. (3-4 cr [max 24 cr])
Fall of Rome through end of the Middle Ages (ca. 300-1500 A.D.) Current topics specified in *Class Schedule*.

MeSt 4610. Intermediate Topics in Medieval Studies. (3-4 cr [max 24 cr])
Current topics, between the fall of the Roman Empire and the end of the Middle Ages (ca. 300-1500 A.D.), specified in *Class Schedule*.

MeSt 5610. Advanced Topics in Medieval Studies. (3-4 cr [max 15 cr]. Prereq–One yr work in some area of Middle Ages, reading knowledge of appropriate language)
From late antiquity through end of Middle Ages (circa 300-1500 A.D.). Current topics specified in *Class Schedule*.

MeSt 5993. Directed Studies in Medieval Studies. (3 cr [max 6 cr]. Prereq–One yr work in some area of Middle Ages, reading knowledge of appropriate language, #)
Directed study with one of the core faculty of medieval studies program.

Microbial Engineering (MicE)

BioTechnology Institute

College of Biological Sciences

MicE 5309. Biocatalysis and Biodegradation. (3 cr. Prereq–Chem through organic chem, microbial or adv chem, knowledge of word proc, e-mail, WWW access; access to college-level sci library recommended)
Assessing validity of information on biocatalysis and biodegradation; fundamentals of microbial catabolic metabolism as it pertains to biodegradation of environmental pollutants; biocatalysis for specialty chemical synthesis; display of this information on the World Wide Web.

MicE 5355. Advanced Fermentation and Biocatalysis Laboratory. (3 cr; A-F only. Prereq–[Biol 3301 or MicB 3301], [grad student in microbial engineering or upper-div major in [microbiology or chem engineering or biochemistry]], #)
Methods in industrial microbiology, laboratory, and pilot scale fermentation/biocatalysis engineering. Laboratory experiments carried out in fermentation pilot plant. Operation of bench scale and pilot scale bioreactors, designing bioreactors, process optimization, process monitoring/control, scale-up experiments, experimental design, data analysis.

Microbiology (MicB)

Department of Microbiology

Medical School

MicB 2022. General Microbiology. (2 cr. §VPB 2022. Prereq–Biol 1002 or 1009)
Intended primarily for non-microbiology majors. Fundamental principles of microbiology; bacterial metabolism, growth and genetics; biology of viruses and fungi; control of microorganisms; host-microbe interactions; microorganisms and disease; applied microbiology.

MicB 2032. General Microbiology With Laboratory. (4 cr. §3301, §Biol 2032, §Biol 3301, §VPB 2032. Prereq–[1009 or Biol 1002], Chem 1022; primarily for non-microbiology majors)
Fundamental principles of microbiology. Bacterial metabolism, growth, and genetics. Biology of viruses/fungi. Control of microorganisms. Host-microbe interactions. Microorganisms and disease. Applied microbiology. Includes lab.

MicB 3301. Biology of Microorganisms. (5 cr; A-F only. §2032, §Biol 2032, §Biol 3301, §VPB 2032. Prereq–[¶Biol 1002, ¶Chem 2302] or [¶Biol 1009, [¶Biol 3021 or ¶Bioc 3021]])
Taxonomy, anatomy, physiology, biochemistry, pathogenesis, immunology, ecology of microbes. Molecular structure in relation to bacterial function/disease. Includes lab.

MicB 4001. Microorganisms and Disease. (2 cr. Prereq–4 cr biol sci, 7 cr chem or #; not open to microbiology majors; does not count toward 11 upper div cr in biology major)
Pathogenic microorganisms, host-parasite interactions, disease treatment and prevention.

MicB 4111. Microbial Physiology and Diversity. (3 cr. Prereq–MicB/VPB 2022 or Biol/MicB/VPB 2032 or Biol/MicB 3301, Biol/BioC 3021 or BioC 4331, 3 cr genetics)
Structural and functional organization of Bacteria and Archaea. Energy metabolism utilizing light, inorganic and organic chemicals. Cell morphologies, roles and assembly of surface structures. Growth and survival mechanisms in various extreme environments. Adaptation to changing conditions by development of specialized cells and structures, and altering metabolic patterns.

MicB 4121. Microbial Ecology and Applied Microbiology. (3 cr; A-F only. §Soil 4121. Prereq–Biol/MicB 3301)
Evolution and structure of microbial communities; population interaction within ecosystems; quantitative and habitat ecology; biogeochemical cycling; molecular microbial ecology, gene transfer in the environment; molecular phylogeny of microorganisms. Application of microbes in agriculture; production of commodity chemicals, drugs, and other high-value products.

MicB 4131. Immunology. (3 cr. Prereq–MicB/VPB 2022 or Biol/MicB/VPB 2032 or Biol/MicB 3301; Biol/BioC 3021 or BioC 4331)
Molecular, genetic, and cellular bases for humoral and cell-mediated immunity; innate immunity; antigen recognition by B and T lymphocytes; interactions between lymphocytes and other cells of the immune system; cytokines; immunoregulation; key aspects of clinical immunology.

MicB 4141W. Biology, Genetics and Pathogenesis of Viruses. (3 cr. Prereq–Biol 4003, Biol 4004 or Biol/MicB 3301)
Structure, composition and properties of bacterial, plant and animal viruses; interaction with cells; effects on host cell metabolism; molecular biology of virus replication and genetics; techniques for studying virus properties; viral pathogenesis and tumorigenesis.

MicB 4151. Molecular and Genetic Bases for Microbial Diseases. (3 cr. Prereq–[3001 or 3301 or equiv], [4131 or ¶4131], [BioC 3021 or Biol 3021 or BioC 4331]; [Biol 4003 or GCB 3022] recommended)
Genetic basis of microbial pathogenesis. Effect of gene transfer/regulation on evolution of microbial pathogens and on their capacity to colonize, induce disease. Biochemical/cellular interactions between bacteria and their human hosts.

MicB 4215. Advanced Laboratory: Microbial Physiology and Diversity. (3 cr; A-F only. Prereq–4111 or ¶4111)
Isolation/cultivation of wide variety of bacteria. Physiological experiments illustrate characteristic features of microorganisms.

MicB 4235. Advanced Laboratory: Virology, Immunology and Microbial Genetics. (3 cr. Prereq–Biol/BioC 3021 or equiv, Biol/MicB 3301, two of the following MicB 4131, 4141, 4151)
Techniques and experimental methods in microbial genetics, immunology and virology used to study microbes and their interactions with a host.

MicB 4793W. Directed Studies: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements)
Individual study on selected topics or problems. Emphasizes readings, use of scientific literature.

MicB 4794W. Directed Research: Writing Intensive. (1-7 cr [max 15 cr]; S-N only. Prereq–#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements)
Laboratory or field investigation of selected areas of research.

MicB 4993. Directed Studies. (1-7 cr [max 7 cr]; S-N only. Prereq–Cr ar, Biol/MicB 3301, or #, 7 cr of MicB 4993 and/or 4994 may count toward major requirements)
Individual study on selected topics or problems with emphasis on selected readings and scientific literature.

MicB 4994. Directed Research. (1-7 cr [max 7 cr]; S-N only. Prereq–Cr ar; Biol/MicB 3301, #, 7 cr max of MicB 4993 and/or 4994 may count toward major requirements)
Lab or field investigation of selected areas of research.

MicB 5205. Microbiology and Immunology for Medical Students. (0-7 cr)
Basic/clinical human immunology, medical microbiology. Molecular/cellular basis of immune responses, tolerance. Immunologic disease, serology, antimicrobial agents, chemotherapy. Basic/medical bacteriology, parasitology, mycology, virology. Unifying principles governing pathogenesis. Diseases are grouped with organisms important in differential diagnosis.

MicB 5352. Applied Microbial Biochemistry. (3 cr; A-F only. §BioC 5352. Prereq–Biol/BioC 3021 or BioC 4331 or MicB 4111, MicB 3301 or #)
Biochemistry of microorganisms and enzymes of industrial interest. Heterologous peptide overproduction by microorganisms and yeasts; polymer, antibiotic, organic acid, and amino acid production; genetics of industrially useful microorganisms; biological systems useful for biotransformation and environmental remediation; introduction to fermentation technology.

Middle Eastern Languages and Cultures (MELC)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

MELC 1904. Freshman Seminar. (3 cr; A-F only)
Topics vary. See *Class Schedule*.

MELC 3491. Classical Islamic Civilization. (3 cr. §Afro 3491, §Hist 3491)
Islamic legacy in the classical age (800-1400) in medical and natural sciences, mathematics, philosophy, literature, and transmission to Europe.

MELC 3505. Survey of the Middle East. (3 cr. §Arab 3505, §Hist 3505)
Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present.

MELC 3511. Ancient Iran. (3 cr. §CAS 3511)
The development of ancient Iranian culture under the Achaemenians and the Sassanians, the impact of the Zoroastrian religion on Iranians and of Hellenism on the east, especially on such domains as Bactria, Iran's contribution to the flourishing of the cultures of the Silk Road, the thread that connected distant China and Europe.

MELC 3512. Modern Iran. (3 cr. §CAS 3512)
Development of medieval Iranian culture under the Arab, Turkish, and Mongol rules. Study two major trends: Islamization beginning after the Arab conquest until A.D. 1500; westernization from the Safavids to the Islamic Republic in 1979.

MELC 3526. Islam and Communism. (3 cr. §5526, §CAS 3526)
Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic principles with Communist dicta; Pan-Islamism; Pan-Turkism.

MELC 3531. Central Asian Culture. (3 cr. §CAS 3511)
Development of Central Asian cultures from the rise of the Turkish dynasties (6th c.) to the present. Indo-European indigenous population displaced by the Arabs, Turks, Mongols, and the Soviets. Major themes: Islamization; Turkification; Westernization; and Sovietization.

MELC 3532. Russia and Central Asia. (3 cr. §5532, §CAS 3532)
Rise and fall of the Mongol Empire, formation of the Chaghatai Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

MELC 3541. Islam in the Catholic Age: Arab Phase 600 A.D. to 900 A.D. (3 cr. §Arab 3541, §Hist 3541)
The rise of Islam in its Arabian setting. Roles of the prophet, the Orthodox and Umayyad Caliphs. Development of Islamic state and empire. Status of Muslims and non-Muslims.

MELC 3542. Medieval Islam. (3 cr. §Arab 3542, §Hist 3542)
Islamic dynasties, Mamluks and Mongols, Crusaders and Assassins. Abbasid Caliphate's disintegration and rise of Seljuk Turks.

MELC 3543. Arabs under Mamluks and Ottomans: 1300-1920. (3 cr. §Arab 3543, §Hist 3543)
Arabs under Mamluk rule. Struggle against Crusaders and Mongols. Disintegration and reemergence under Muhammad Ali of Egypt, dynastic struggles in Syria, rise of Young Turks and Arab revolt.

MELC 3544. Arab World 1920 Until the Present. (3 cr. §Arab 3544, §Hist 3544)
Struggle in the Arab world for independence and its course since independence. Emphasis on development, political stability and unity, political structures, and the Arab-Israeli conflict.

MELC 3601. Fiction of Iran and Central Asia. (3 cr. §5601, §CAS 3601)
Social, political, and religious thought of Iranian and (Soviet) Central Asian writers of fiction since the early years of the 20th century; emphasizes themes of tradition, modernization (Westernization and Sovietization), women's rights, and secularization.

MELC 3602. Persian Poetry. (3 cr. §5602, §CAS 3602)
Major poetic works of Iran in translation dealing with life at the medieval courts, Sufic poetry, and "new" poetry. Rudaki, Khayyam, Rumi, Hafiz, Yushij, and Farrukhzad are among the poets whose works are examined.

MELC 3900. Topics in Middle Eastern Languages and Cultures. (1-4 cr [max 16 cr]; A-F only)
Topics vary. See *Class Schedule* or contact department for details.

MELC 3993. Directed Studies. (1-10 cr [max 10 cr]. Prereq–#, Δ, ❑)
Guided individual study.

MELC 3994. Directed Research. (1-10 cr. Prereq–#, Δ, ❑)

MELC 5311. Medieval Sages. (3 cr. §CAS 5311. Prereq–Background in Iranian, Central Asian, or Islamic studies recommended)
Study and discussion of the intellectual life of the region from the rise of the Ghaznavids (A.D. 1000) to the fall of the Timurids (A.D. 1500). Ibn Sina (Avicenna), al-Biruni, al-Ghazali, Rumi, Sa'di, and Firdowsi are among the sages whose lives are examined.

MELC 5526. Islam and Communism. (3 cr. §3526, §CAS 5526)
Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic principles with Communist dicta; Pan-Islamism; Pan-Turkism.

MELC 5532. Russia and Central Asia. (3 cr. §3532, §CAS 5532)
Rise and fall of the Mongol Empire, formation of the Chaghatai Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

MELC 5601. Fiction of Iran and Central Asia. (3 cr. §3601, §CAS 5601)
Social, political, and religious thought of Iranian and (Soviet) Central Asian writers of fiction since the early years of the 20th century, emphasizing themes of tradition, modernization (Westernization and Sovietization), women's rights, and secularization.

MELC 5602. Persian Poetry. (3 cr. §3602, §CAS 5602)
Major poetic works of Iran dealing with life at the medieval courts, Sufic poetry, and "new" poetry are studied. Rudaki, Khayyam, Rumi, Hafiz, Yushij, and Farrukhzad are among the poets whose works are examined.

MELC 5993. Directed Studies. (1-10 cr. Prereq–#, Δ, ❑)

MELC 5994. Directed Research. (1-10 cr. Prereq–#, Δ, ❑)

Military Science (Mil)

Department of Military Science (Army ROTC)

Office of the Executive Vice President and Provost

Mil 0101. Military Science I Leadership Lab. (0 cr; A-F only. Prereq–Enrollment in Mil 1010)
Learn and practice basic skills. Gain insight into the Advanced course in order to make an informed decision whether to apply for it. Build self confidence and team-building leadership skills that can be applied throughout life.

Mil 0201. Military Science II Leadership Lab. (0 cr; A-F only. Prereq–Enrollment in 1220)
Learn and practice basic military skills. Gain insight into the Advanced Course in order to make an informed decision whether to apply for it. Build self confidence and team-building leadership skills that can be applied throughout life.

Mil 0301. Military Science III Leadership Lab. (0 cr. Prereq–Enrollment in Mil 3130)
Open only to students in the associated Military Science Course series with different roles for students at different levels. Involves leadership responsibilities for the planning, coordination, execution and evaluation of various training and activities with Basic course students and for the AROTC program as a whole. Students develop, practice and refine leadership skills by serving in a variety of leadership positions.

Mil 0401. Military Science IV Leadership Lab. (0 cr. Prereq–Student must be enrolled in the Advanced Course and associated Military Science class.)
Open only to students in the associated Military Science Course Series. Involves leadership responsibilities for the planning, execution and evaluation of various training activities within the program. Additional duties as a primary or secondary staff member is necessary for the completion of this course. Assist in the development of Basic and Advance Course cadet's leadership skills.

Mil 1001. Military Science I Leadership Lab. (1 cr. Prereq–Enrollment in 1010)
Learn and practice basic skills. Gain insight into the Advance Course in order to make an informed decision whether to apply for it. Build self confidence and team building leadership skills that can be applied throughout life.

Mil 1002. Military Science I Leadership Lab. (1 cr. Prereq–Enrollment in 1011)
Learn and practice basic skills. Gain insight into the Advance Course in order to make an informed decision whether to apply for it. Build self confidence and team building leadership skills that can be applied throughout life.

Mil 1003. Military Science II Leadership Lab. (1 cr. Prereq–Enrollment in 1220)
Learn and practice basic skills. Gain insight into the Advance Course in order to make an informed decision whether to apply for it. Build self confidence and team building leadership skills that can be applied throughout life.

Mil 1004. Military Science II Leadership Lab. (1 cr. Prereq–Enrollment in 1221)
Learn and practice basic leadership skills. Build self confidence through individual and team building concepts. Gain insight into the advance course in order to make an informed decision on whether to apply. Further develop your leadership style through practical application scenarios.

Mil 1005. Military Science III Leadership Lab. (1 cr. Prereq–Enrollment in 3130)
Involves leadership responsibilities for the planning, coordination, execution, and evaluation of various training and activities with Basic Course students and for the ROTC program. Students develop, practice, and refine leadership skills by serving and being evaluated in a variety of responsible positions.

Mil 1006. Military Science III Leadership Lab. (1 cr. Prereq–Enrollment in 3131)
Involves leadership responsibilities for the planning, coordination, execution, and evaluation of various training and activities with Basic Course students and for the ROTC program. Students develop, practice, and refine leadership skills by serving and being evaluated in a variety of responsible positions.

Mil 1007. Military Science IV Leadership Lab. (1 cr. Prereq–Enrollment in 3140)
Involves leadership responsibilities for the planning, coordination, execution, and evaluation of various training and activities with Basic Course students and for the ROTC program. Students develop, practice, and refine leadership skills by serving and being evaluated in a variety of responsible positions.

Mil 1008. Military Science IV Leadership Lab. (1 cr. Prereq–Enrollment in 3141)
Involves leadership responsibilities for the planning, coordination, execution, and evaluation of various training and activities with Basic Course students and for the ROTC program. Students develop, practice, and refine leadership skills by serving and being evaluated in a variety of responsible positions.

Mil 1010. Introduction to ROTC. (1 cr. Prereq–Enrollment in 1001)
Increase self-confidence through team study and activities in basic drill, physical fitness, rappelling, leadership reaction course, first aid, making presentations, and basic marksmanship. Learn fundamental concepts of leadership in a profession in both classroom and outdoor lab environments.

Mil 1011. Introduction to Leadership. (1 cr. Prereq–Enrollment in 1002)
Learn/apply principles of effective leading. Reinforce self-confidence through participation in physically and mentally challenging exercises. Relate organizational ethical values to the effectiveness of a leader. Participation in a weekend exercise is optional, but highly encouraged.

Mil 1220. Self/Team Development. (2 cr; A-F only. Prereq–Enrollment in Basic Course)
Learn and apply ethics-based leadership skills that develop individual abilities and contribute to the building of effective teams. Develop skills in oral presentations, writing concisely, planning of events, coordination of group efforts, advanced first aid, land navigation, and basic military tactics. Fundamentals of ROTC's Leadership Development program.

Mil 1221. Individual/Team Military Tactics. (2 cr; A-F only. Prereq–Enrollment in Basic Course)
Individual and team aspects of military tactics in small unit operations. Use of radio communications, making safety assessments, movement techniques, planning for team safety/security and methods of pre-execution checks. Practical exercises with upper division ROTC students.

Mil 3130. Leading Small Organizations I. (3 cr. Prereq–Enrollment in Advanced Course)
Series of practical opportunities to lead small groups, receive personal assessments and encouragement, and lead again in situations of increasing complexity. Uses small unit defensive tactics and opportunities to plan and conduct training.

Mil 3131. Leading Small Organizations II. (3 cr. Prereq–Enrollment in Advanced Course)
Continues methodology of 3130. Analyze tasks; prepare written or oral guidance for team members to accomplish tasks. Delegate tasks and supervise. Plan for and adapt to the unexpected in organizations under stress.

Mil 3140. Leadership Challenges and Goal Setting. (3 cr. Prereq–Enrollment in Advanced Course)
Plan, conduct, and evaluate activities of the ROTC cadet organization. Articulate goals, put plans into action to attain them. Assess organization cohesion and develop strategies to improve it. Develop confidence in skills to lead people and manage resources. Learn/apply various Army policies and programs.

Mil 3141. Transition to Lieutenant. (3 cr. Prereq–Enrollment in Advanced Course)
Continues the methodology from 3140. Identify and resolve ethical dilemmas. Refine counseling and motivating techniques. Examine aspects of tradition and law as they relate to leading as an officer in the Army. Prepare for a future as a successful Army lieutenant.

Mil 3970. Directed Studies. (3 cr. Prereq–Δ)

Modern Greek (MdGk)

Department of Classical and Near Eastern Studies

College of Liberal Arts

MdGk 1001. Beginning Modern Greek I. (4 cr)
Speaking and reading demotic Greek. Pattern-practice drill, simple readings, some grammar.

MdGk 1002. Beginning Modern Greek II. (4 cr. Prereq–1001 or #)
Speaking and reading demotic Greek. Pattern-practice drill, simple readings, some grammar.

MdGk 1003. Intermediate Modern Greek I. (4 cr. Prereq–1002 or #)
Review the fundamentals of syntax through various readings from Modern Greek prose writers and poets. Provides additional grammatical elements which are reinforced through reading, conversation, and composition.

MdGk 1004. Intermediate Modern Greek II. (4 cr. Prereq–1003 or #)
Review the fundamentals of syntax through various readings from Modern Greek prose writers and poets. Provides additional grammatical elements which are reinforced through reading, conversation, and composition.

Mortuary Science (Mort)

Department of Cell Biology and Neuoranatomy

Medical School

Mort 3005. History of Funeral Service. (2 cr; A-F only)
Development of funeral practices from a historical perspective with emphasis on ethnic and cultural groups that have had an impact on contemporary funeral service.

Mort 3012. Organization and Management of Funeral Business. (3 cr; A-F only. Prereq–Mortuary science major)
Principles and concepts of business organization and structure. Focus is on differences/similarities of funeral home management in a small business setting versus a corporate funeral home setting.

Mort 3014. Funeral Service Rules and Regulations. (3 cr; A-F only. Prereq–Mortuary science major)
Licensing/government regulations, compliance with regulations of state/federal regulatory agencies, cemetery and crematory rules and regulations, and Federal Trade Commission Funeral Practice Rule for the funeral industry.

Mort 3016. Funeral Service Marketing and Merchandising. (3 cr; A-F only. Prereq–Mortuary science major)
Funeral home marketing and merchandising, including advertising, promotion, purchasing, and pricing.

Mort 3018. Funeral Practice. (3 cr; A-F only. Prereq–Mortuary science major)
Practices and procedures related to funeral directing, including social, religious, ethical, and cultural issues; event planning; conducting funeral ceremonies; record keeping; computer applications.

Mort 3021W. Funeral Service Psychology. (3 cr; A-F only)
Applied psychological principles helpful in dealing with clients, especially those experiencing emotional crisis.

Mort 3022W. Funeral Service Counseling. (3 cr; A-F only)
Principles, techniques, and basic helping skills of counseling as applied to funeral arrangement conference.

Mort 3025. Mortuary and Business Law. (3 cr; A-F only. Prereq–Mortuary science major)
Basic concepts and principles of business law. Review of mortuary law.

Mort 3050. Embalming Pathology. (3 cr; A-F only. Prereq–Mortuary Science major)
Comprehensive study of diseases, disease processes, their effects on the body. Focuses on nature/effects of pathological conditions as they relate to procedures applied in embalming, restorative art.

Mort 3051. Restorative Art. (2 cr; A-F only. Prereq–Mortuary science major)
Theory and procedures of restorative art.

Mort 3055W. Complicated Grief. (3 cr; A-F only. Prereq–Working understanding of grief/loss)
Issues related to loss, grief, bereavement, traumatology. Complicated bereavement/traumatology, complicated vs. non-complicated loss. Current treatment methods.

Mort 3061. Embalming Theory. (3 cr; A-F only. Prereq–Mortuary science major)
Principles/procedures of embalming theory as related to funeral service practice.

Mort 3062W. Embalming II. (3 cr; A-F only. Prereq–Mortuary science major)
Theory and procedure of embalming.

Mort 3065. Embalming Chemistry. (2 cr; A-F only. Prereq–Intro course in general chemistry, registration in mortuary science)
Fundamentals of organic chemistry and biochemistry. Chemical changes in human body during life, after death, and during chemical preservation. Disinfection, toxicology, embalming fluids.

Mort 3090. Independent Study Project. (1-3 cr [max 6 cr]. Prereq–Matriculated mortuary science student)
Independent study course for which a final project, paper, or test is required as contracted between instructor, program director, and student.

Mort 3091W. Independent Study in Funeral Service. (1-4 cr [max 4 cr]. Prereq–Mortuary science major)
Students complete a project supervised by a faculty member. Credit(s) is negotiated with the faculty member based on the size and scope of the project. Students must demonstrate that the project has value within the major.

Mort 3151. Restorative Art Laboratory. (1 cr; A-F only. Prereq–Mortuary science major)
Practical principles and techniques for restorative art. Emphasis on modeling facial features with clay or wax and the use of restorative techniques and cosmetic application on dead human bodies.

Mort 3161. Embalming Laboratory. (1 cr; S-N only. Prereq–Mortuary science major)
Practices/procedures of embalming in a preparation room setting using human cadavers.

Mort 3370. Funeral Service Seminar. (1 cr; S-N only. Prereq–Mortuary science major)
Selected presentations related to topics and issues in funeral service.

Mort 3379. Clinical Funeral Service Rotation. (2 cr [max 10 cr]; S-N only. Prereq–Mortuary sci major, matriculated into prog)
Practical experience working in clinical settings related to funeral service. Rotation sites include licensed funeral homes, licensed crematories, licensed cemeteries, and affiliate institutions such as hospices, hospitals, morgues, and coroner/medical examiners offices.

Mort 3380. Funeral Service Practicum. (8 cr; S-N only. Prereq–Mortuary science major who has completed all other coursework)
Practical experience during one academic term in a funeral home as assigned by the program.

Museum Studies (MSt)

Graduate School

MSt 5011. Museum History and Philosophy. (3 cr; A-F only. Prereq–#)
Historical and philosophical roots of museum development in Europe and North America from the Renaissance to modern day museums and history centers. Emerging philosophical issues faced by museums today.

MSt 5012. Museum Practices. (3 cr; A-F only. Prereq–5011 or #)
Practical aspects of museum work. Standards, practices, responsibilities, and issues, all set in greater museum context. Curatorial and educational duties, collections management, security, funding, boards, public relations, installation, and budgeting.

MSt 5020. Internship. (1-4 cr [max 32 cr]; S-N only. Prereq–5011, 5012, Δ)
Students arrange to perform a professional-level task in a museum of good standing under close supervision of a member of the museum's professional staff. Instructor must approve a work plan and report.

Music (Mus)

School of Music
College of Liberal Arts

Mus 0901. Junior Recital. (0 cr; A-F only. Prereq–Music major, concurrent registration in applied music, #, Δ)
Preparation for junior recital. Student will be supervised by major applied instructor.

Mus 0951. Senior Recital. (0 cr; A-F only. Prereq–Music major, concurrent registration in applied music, #, Δ)
Preparation for senior recital. Student will be supervised by major applied instructor.

Mus 1001. Fundamentals of Music. (3 cr. Prereq–For non-music majors)
Study of music notation and fundamental concepts underlying musical structure. Intervals, clefs, chords, scales, cadences, harmonic analysis; rhythm and meter. Emphasis on active participation: playing the piano, singing, clapping rhythms, aural perception. Weekly lab assignments in vocal and piano performance.

Mus 1021. Introduction to Music. (3 cr. §3021)
Survey of European/American "art," "popular" music in context of those cultures. Aural analyses of musical styles/forms.

Mus 1051. Class Piano for Nonmusic Majors I. (2 cr)
For nonmusic majors with little or no keyboard background. Functional skills such as reading, harmonizing, playing by ear and improvising, along with basic technique and study of elementary solo and ensemble repertoire.

Mus 1052. Class Piano for Non Music Majors II. (2 cr [max 2 cr])
For nonmusic majors with little or no keyboard background. Functional skills such as reading, harmonizing, playing by ear and improvising, along with basic technique and study of elementary solo and ensemble repertoire.

Mus 1151. Piano: Class Lessons I. (2 cr; A-F only. Prereq–Fr music major with limited keyboard background, Δ)
Functional skills such as reading, transposing, harmonizing, improvising, and playing by ear. Keyboard theory, technique, and repertoire.

Mus 1152. Piano: Class Lessons II. (2 cr; A-F only. Prereq–Fr music major with limited keyboard background, Δ)
Functional skills such as reading, transposing, harmonizing, improvising, and playing by ear. Keyboard theory, technique, and repertoire.

Mus 1155. Keyboard Skills I. (2 cr; A-F only. Prereq–[Keyboard major or music major with extensive keyboard background], Δ)
Reading, transposing, harmonizing, improvising, and playing by ear. Keyboard theory, technique, and music learning skills.

Mus 1156. Keyboard Skills II. (2 cr; A-F only. Prereq–[Keyboard major or music major with extensive keyboard background], Δ)
Reading, transposing, harmonizing, improvising, and playing by ear. Keyboard theory, technique, and music learning skills.

Mus 1260. Voice Class. (2 cr [max 4 cr]. Prereq–Basic musicianship for learning and performing simple songs)
The fundamentals of speech and singing including information about the vocal instrument, the vocal process, vocal technique, and how to learn and perform three simple songs.

Mus 1471. Guitar: Class Lessons I. (2 cr; A-F only)
Fundamentals for the beginning guitarist; progressive development of skills. Basic strumming techniques, harmonizations in basic keys. Students must furnish acoustic guitar.

Mus 1472. Guitar: Class Lessons II. (2 cr; A-F only. Prereq–1471 or #)
Fundamentals for the beginning guitarist; progressive development of skills. Advanced strumming techniques, bass runs, finger-picking strums. Students must furnish acoustic guitar.

Mus 1501. Foundations of Musical Theory: Analysis and Ear-Training I. (3 cr; A-F only. Prereq–[Music major or #], permission number)
Basics of common-practice tonal harmony, part-writing, music analysis in various contexts, ear-training/sight singing.

Mus 1502. Foundations of Musical Theory, Analysis, and Ear-Training II. (3 cr; A-F only. Prereq–[1501 or diagnostic test administered by School of Music], permission number)
Basics of common-practice tonal harmony/part-writing, music analysis in various contexts, ear-training, sight singing.

Mus 1801W. Music, Society, and Cultures. (3 cr; A-F only. Prereq–[Music major or #], permission number)
Study rural, urban, tribal musics throughout world with interdisciplinary methods of humanities/social sciences. World-wide distribution of musical creativity with audio/video documentation.

Mus 1804. World Music. (3 cr)
Music in universal perspectives. Traits, styles, genres, instrument design, and cultural factors of usage and function. Listening awareness through aural analysis and culture comparison. World-wide distribution of musical creativity with audio and video documentation.

Mus 1902. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule*.

Mus 1905. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule*.

Mus 1907W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule*.

Mus 1910W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule*.

Mus 3001W. Foundations of Musical Thought. (4 cr; A-F only)
Develop a range of strategies for listening to music and for thinking about music in an informed way. Wide range of musical styles including classical, ethnic, and popular idioms.

Mus 3021. Introduction to Music. (3 cr)
Survey of European and American "art" and "popular" music in the context of those cultures; aural analyses of musical styles and forms.

Mus 3027. Lyric Song in Medieval Culture. (3 cr)
Courtly, paraliturgical, and popular song traditions from 1100 to1500 in specific contexts: castle, palace, monastery, nunnery, cathedral, theater, tavern, street, and countryside. Social roles of men and women as patrons, performers, poets, composers. Write historical narratives and recreate medieval performance traditions.

Mus 3029. Music in the 20th Century. (3 cr)
Music in European and American culture from 1890s to present. Emphasizes interactions between high art, popular and ethnic musics, contributions of men and women as composers and performers, concurrent developments in the arts, dance, and literature, and music as social commentary.

Mus 3045. The Avant-Garde. (3 cr; A-F only)
Introduction to recent music. Composers of the American musical avant-garde, ca. 1950-1970, including John Cage and Pauline Oliveros, in their sonic/social contexts. Non-Western culture's recent effect on music. Reading, listening, journal writing, original composition, performance.

Mus 3150. Accompanying Skills. (1 cr [max 8 cr]; A-F only. Prereq–Jr or sr piano or organ major or #)
A practical introduction to every facet of the art of piano as an accompaniment and collaborative instrument.

Mus 3230. Chorus. (1 cr [max 8 cr]. Prereq–Choral and/or instrumental music background; audition, #)
Includes the University Women's Chorus, Men's Chorus, Concert Choir, and Choral Union. Choirs participate in a variety of programs exploring both Western and non-Western repertoire from the Middle Ages through the 20th century. Concerts include touring, and collaborative campus and community performances.

Mus 3241. Vocal Literature I: German Lieder. (1 cr; A-F only. Prereq–Vocal performance or accompanying major, 2 yrs music theory and music history)
An exploration of the German Lied, its origins, composers, and development. Musical and textual analysis of representative works, examination of the poetry which serves as song text, and brief survey of poets in the German Romantic period. Extensive listening assignments.

Mus 3242. Vocal Literature II: French Melodie. (1 cr; A-F only. Prereq–Vocal music or accompanying major; 2 yrs of music theory and music history)
The French Mélodie, its origins, composers, and development. Musical and textual analysis of representative works, examination of the poetry which serves as song text, and brief survey of the French Symbolist poets. Extensive listening assignments.

Mus 3261. Italian Diction for Singers. (1 cr; A-F only. Prereq–Voice or choral music major; concurrent regis in applied voice)
The sounds and symbols of the International Phonetic Alphabet, rules for correct Italian lyric diction, rudimentary Italian grammar, the meanings of Italian musical expressive markings, and Italian words most commonly found in song texts.

Mus 3262. English Diction for Singers. (1 cr; A-F only. Prereq–Voice or choral music major, concurrent regis in applied voice)
English lyric diction for performance of classical vocal music. Use International Phonetic Alphabet for standard transcriptions of song texts, compile a discography of British/American art songs, perform songs in class, and prepare poetry for oral presentation and improvisation.

Mus 3263. German Diction for Singers. (1 cr; A-F only. Prereq–Voice or choral music major, concurrent regis in applied voice)
Principles and practice of German lyric diction for classical vocal music. Transcriptions of German Lieder into International Phonetic Alphabet, elementary German grammar and common song vocabulary, 4 to 5 German songs performed in class for critique, and rules for pronunciation.

Mus 3264. French Diction for Singers. (1 cr; A-F only. Prereq–Voice or choral music major, concurrent regis in applied voice)
Principles and practice of French lyric diction for classical vocal music. Transcriptions of French mélodie into International Phonetic Alphabet, elementary French grammar and common song vocabulary, 4 to 5 French songs performed in class for critique, and rules for pronunciation.

Mus 3331. Jazz Improvisation I. (2 cr; A-F only. Prereq–Music major or #)
Rudiments; analysis; improvisation on blues in three major keys and standard American popular jazz compositions from swing era to early bebop; applications of major and minor scales; ear training.

Mus 3332. Jazz Improvisation II. (2 cr; A-F only. Prereq–#)
Transposition; analysis; improvisation on blues in three major keys and standard American popular jazz compositions from swing era to early bebop; II-V7-I progressions; ear training.

Mus 3340. Jazz Ensemble. (1 cr [max 8 cr]; A-F only. Prereq–Audition, #)
A 20-member performing organization covering significant jazz compositions and arrangements written specifically for this medium.

Mus 3350. Jazz Combo. (1 cr [max 8 cr]; A-F only. Prereq–Audition, #)
A performance laboratory class with emphasis on improvisation and learning the jazz vocabulary. A minimum of two public performances is required each semester.

Mus 3351. Jazz Piano Class I. (2 cr; A-F only. Prereq–1152 or #)
Keyboard skill development in chord-style symbology, reading chord progressions, translating chord symbols into formula voicings, expanded harmonies, aural development, jazz style "comping."

Mus 3352. Jazz Piano Class II. (2 cr; A-F only. Prereq–1152 or #)
Keyboard skill development in chord-style symbology, reading chord progressions, translating chord symbols into formula voicings, expanded harmonies, aural development, jazz style "comping."

Mus 3390. Jazz Singers. (1 cr [max 10 cr]; A-F only. Prereq–Audition, #)
Study and performance of representative vocal jazz literature.

Mus 3401. Basic Conducting. (2 cr; A-F only. Prereq–1502, music major)
Beginning course in basic conducting techniques and role of the conductor.

Mus 3410. University Wind Bands. (1 cr [max 14 cr]; A-F only. Prereq–Audition, #)
Wind ensemble and symphony bands perform standard and contemporary literature; concerts and tour appearances. Players from all colleges may participate.

Mus 3420. Orchestra. (1 cr [max 8 cr]; A-F only. Prereq–Audition, #)
Symphony orchestra performs standard repertory and major works with chorus; concerts and tour appearances. Players from all colleges may participate.

Mus 3430. Campus Orchestra. (1 cr [max 8 cr]. Prereq–Audition, #)
An orchestra for players who are not music majors and/or are unable to register for University Orchestra. Standard chamber orchestra and string orchestra literature rehearsed and performed.

Mus 3440. Chamber Ensemble. (1 cr [max 8 cr]; A-F only. Prereq–#)
Performance of chamber music; duos, trios, quartets, quintets, and other ensemble combinations for instruments and voices.

Mus 3480. Marching Band. (1 cr [max 4 cr]; A-F only. Prereq–#)
A 250-member performing organization open to players from all colleges. Performs at University football games and other athletic functions.

Mus 3501. Theory and Analysis of Tonal Music III. (3 cr; A-F only. Prereq–1501, 1502, dept consent)
Harmony and voice-leading. Diatonic and basic chromatic chords. Form. Analysis of music from 18th/19th centuries. Ear-training, sight-singing.

Mus 3502. Theory and Analysis of Tonal Music IV. (3 cr; A-F only. Prereq–3501, dept consent)
Harmony and voice-leading. Chromatic tonal practices. Form, including sonata, rondo, variations, and other standard categories of tonal composition. Analysis of music from 18th/19th centuries. Ear-training, sight-singing.

Mus 3503. Theory and Analysis of Tonal Music V. (3 cr; A-F only. Prereq–3502)
Harmony and voice-leading. Advanced chromatic practices. Analysis of music from late 19th/early 20th centuries. Ear-training, sight-singing.

Mus 3508. Review of Tonal Theory. (3 cr; A-F only. Prereq–Theory placement exam)
Fast-paced review of 1502 and 3501 focusing on diatonic and basic chromatic procedures. Emphasis on part-writing and analysis.

Mus 3511. Ear-Training and Sight-Singing IV. (1 cr; A-F only. Prereq–3501 or 3518 or appropriate score on Ear-Training Placement Exam)
Melodic, harmonic, and rhythmic dictation; sight-singing; clef reading. Emphasis on chromatic harmony.

Mus 3518. Review of Ear-Training and Sight-Singing. (1 cr; A-F only. Prereq–Theory Placement Exam)
Fast-paced review of 1502 and 3501 focusing on diatonic and basic chromatic procedures. Emphasis on melodic and harmonic dictation. Individual sight-singing auditions.

Mus 3551. Composition Class. (2 cr; A-F only. Prereq–3532, #)
Introduction to 20th century techniques, styles and methodologies of composition. Five principal compositions to be written, plus additional smaller pieces in various forms and combinations. Directed listening and analysis, with emphasis on control of basic craft elements while cultivating original approaches to musical creation.

Mus 3601W. History of Western Music I. (3 cr; A-F only. Prereq–[[1151 or 1155], 1501, music major] or #)
History of European art-music tradition, its social contexts from antiquity to 1700: composers, styles, structures, social institutions.

Mus 3602W. History of Western Music II. (3 cr; A-F only. Prereq–[1502, music major] or #)
History of European art-music tradition, its social contexts from 1700 to 1850: composers, styles, structures, social institutions.

Mus 3603W. History of Western Music III. (3 cr; A-F only. Prereq–[1503, music major] or #)
History of European/American art, popular music traditions from 1850 to present: composers, styles, structures, social institutions.

Mus 3950. Topics in Music. (1-3 cr [max 15 cr])
Each offering focuses on a single topic. Topics specified in *Class Schedule*.

Mus 3993. Directed Studies. (1-4 cr [max 10 cr]; A-F only. Prereq–#, Δ, ❑)
Guided individual reading or study.

Mus 3995. Major Project. (1 cr; A-F only. Prereq–Undergrad music major in B.A. program, Δ, #)
Required of music majors in senior year of the B.A. program. Research paper on topic of student's choice in consultation with faculty mentor. Sign up in Undergraduate Studies office one term in advance.

Mus 5101. Piano Pedagogy I. (2 cr. Prereq–8 cr in MusA 1301 or MusA1401 or #)
Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels.

Mus 5102. Piano Pedagogy II. (2 cr. Prereq–8 cr in MusA 1301 or MusA 1401 or #)
Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels.

Mus 5111. Advanced Piano Pedagogy I. (2 cr; A-F only. Prereq–5102 or grad piano major or #)
Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the intermediate and early advanced levels.

Mus 5112. Advanced Piano Pedagogy II. (2 cr; A-F only. Prereq–5101 or grad piano major or #)
Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the intermediate and early advanced levels.

Mus 5120. Piano Pedagogy Practicum. (1 cr [max 4 cr]; A-F only. Prereq–5101-5102 or 5111-5112 or #)
Supervised teaching of a piano pupil or group of pupils for one semester (minimum 12 weeks for one half-hour per week). Supervising instructor will assist with selection of materials, periodic consultation, and observation (live or video taped) of selected lessons.

Mus 5131. Advanced Keyboard Skills I. (2 cr; A-F only. Prereq–3502, sr or grad)
Diatonic and chromatic harmony at the piano. Realization of figured basses of the 17th and 18th centuries. Performance of choral, orchestral, and chamber music of the 17th to 20th centuries, from open score using all clefs.

Mus 5132. Advanced Keyboard Skills II. (2 cr; A-F only. Prereq–3502, sr or grad)
Diatonic and chromatic harmony at the piano. Realization of figured basses of the 17th and 18th centuries. Performance of choral, orchestral, and chamber music of the 17th to 20th centuries, from open score using all clefs.

Mus 5141. Piano Literature. (2 cr; A-F only. Prereq–12 cr of MusA 1301 or MusA 1401 or #)
Introductory survey of representative keyboard literature from the Baroque to the mid-20th century. Study of typical forms, style features, technical issues, and performance practice for each period.

Mus 5150. Body Awareness in Activity: The Alexander Technique for Musicians. (2 cr [max 4 cr])
Alexander technique with specific applications to music performance. Emphasis on body/mind awareness to promote technical ease and freedom.

Mus 5151. Organ Literature I. (3 cr; A-F only. Prereq–3502, 3603, sr or grad or #)
Organ literature from the 14th century to the mid-18th century. Influence of organ design of various periods and national schools on the literature and its performance.

Mus 5152. Organ Literature II. (3 cr; A-F only. Prereq–3502, 3603, sr or grad or #)
Organ literature of J. S. Bach and of other 19th- and 20th-century composers. Influence of organ design of various periods and national schools on the literature and its performance.

Mus 5160. Instrumental Accompanying Skills and Repertoire. (2 cr [max 4 cr]; A-F only. Prereq–Accomp major)
Performance class in accompanying skills particular to orchestral reductions and non-sonata instrumental accompanying. Repertoire to include, but not be limited to, classical and romantic string concerti, and "encore" pieces.

Mus 5170. Vocal Accompanying Skills and Repertoire. (2 cr [max 4 cr]; A-F only. Prereq–French, German and Italian diction, accomp or grad vocal major)
Performance class (Lieder, melodie, opera) with emphasis on coaching techniques and performance skills of pianists and singers.

Mus 5181. Advanced Piano Literature I. (2 cr; A-F only. Prereq–grad piano maj or #)
Literature for piano from late Baroque period to mid-20th century.

Mus 5182. Advanced Piano Literature II. (2 cr; A-F only. Prereq–grad piano major or #)
Literature for piano from late Baroque period to mid-20th century.

Mus 5230. Chorus. (1 cr [max 8 cr]. Prereq–Choral and/or instrumental music background; audition, #)
University Women's Chorus, Men's Chorus, Concert Choir and Choral Union. Choirs participate in a variety of programs exploring both Western and non-Western repertoire from the Middle Ages through the 20th century. Concerts include touring, and collaborative campus and community performances.

Mus 5240. Chamber Singers. (1 cr [max 8 cr]; A-F only. Prereq–Audition, #)
Mixed chorus of about 24 voices. Performances each semester of works for small choirs.

Mus 5241. Vocal Literature I. (3 cr; A-F only. Prereq–[12 cr in MusA 1304, grad music student] or #)
Vocal literature of major/minor composers from 17th century to present. Structure, style, performance practice.

Mus 5242. Vocal Literature II. (3 cr; A-F only. Prereq–12 cr in MusA 1104 or MusA 1304, grad music major or #)
Vocal literature of major and minor composers from 17th century to present; structure, style, and performance practice.

Mus 5250. Opera Workshop and Ensemble. (1 cr [max 8 cr]; A-F only. Prereq–audition, #)
Preparation and performance of operatic arias, choruses, and scenes. Participation in fully staged or workshop productions of music theatre repertoire.

Mus 5260. Stage Movement and Acting for Singers. (1 cr [max 4 cr]; A-F only. Prereq–Audition, #)
Basic techniques of stage movement and acting styles, application to various forms of music theatre.

Mus 5270. Voice Practicum. (1 cr [max 2 cr]. Prereq–Undergrad sr vocal major or #)
Teaching voice class or individual students with peer and faculty feedback. Assist in class voice instruction or teach two students weekly in conjunction with two one-hour observation labs. May be taken for two semesters.

Mus 5271. Diction for Singers I. (2 cr; A-F only. Prereq–12 cr of MusA 1304 or grad music major or #)
Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

Mus 5272. Diction for Singers II. (2 cr; A-F only. Prereq–12 cr MusA 1304 or grad music major or #)
Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

Mus 5275. Vocal Pedagogy I. (3 cr. Prereq–Sr vocal major or #)
Advanced study of mind/body preparations for singing, anatomy, and physiology of the vocal mechanism. Voice use and care, historical and comparative pedagogy, learning theories, models and guidelines for teaching, instructional techniques, and diagnosing and solving vocal problems.

Mus 5276. Vocal Pedagogy II. (2 cr; A-F only. Prereq–Sr vocal major or #)
History of solo vocal performance; selection and preparation of beginning level solo vocal repertoire; development of vocal performance skills (interpretation, expression, artistry), recital programming, and vocal career counseling.

Mus 5277. Vocal Workshop. (1 cr; A-F only. Prereq–Music major or #)
Short term vocal workshops address specific topics including voice science, pedagogy, and performance of vocal repertoire. One workshop focuses on class voice instruction.

Mus 5279. Group Voice: Performance/Pedagogy. (2-3 cr; A-F only. Prereq–Performance only track: 2 cr per sem; performance/Pedagogy track: 3 cr per sem; [upper div student or grad student], #)
Foundations/fundamentals of speech/singing. Vocal production, anatomy, physiology, terminology. Application of vocal techniques in learning/performing repertoire. Teaching methods, including voice/motion exercises.

Mus 5280. Opera Theatre. (2 cr [max 16 cr]; A-F only. Prereq–Audition, #)
Preparation and performance of fully-staged operatic production. Major involvement in singing, acting, and technical aspects of opera.

Mus 5283. Choral Conducting Technique. (1 cr; A-F only. Prereq–#)
Choral conducting, rehearsal techniques, interpretation of music.

Mus 5284. Choral Conducting I: Gregorian Chant Through Baroque Era. (3 cr; A-F only. Prereq–#)
Techniques and rehearsal procedures. Focus on music before 1750 including works by Lassus, Schutz, Bach, and Handel.

Mus 5285. Choral Conducting II: Classical Era to the Present. (3 cr; A-F only. Prereq–#)
Technique and rehearsal procedures. Focus on music after 1750 including works by Mozart, Haydn, Beethoven, Mendelssohn, Brahms, and Stravinsky.

Mus 5300. Jazz Rhythm Section Techniques. (1 cr [max 8 cr]; A-F only. Prereq–#)
Study and function of instruments in the jazz rhythm section. Bass line construction, voicings for piano and guitar, and style patterns for percussion.

Mus 5336. Jazz Arranging. (3 cr; A-F only. Prereq–3502 or #)
Beginning techniques of arranging for jazz combo and jazz ensemble; vocal and instrumental.

Mus 5340. Jazz Ensemble. (1 cr [max 6 cr]; A-F only. Prereq–Audition, #)
A 20-member performing organization covering significant jazz compositions and arrangements written specifically for this medium.

Mus 5341. Jazz Pedagogy. (2 cr; A-F only. Prereq–#)
Teaching methods of vocal and instrumental jazz improvisation, basic arranging techniques, and jazz history; bibliographies and materials.

Mus 5342. Jazz Theory. (3 cr; A-F only. Prereq–3502 or #)
Beginning through advanced techniques for chord construction. Extended chords. Nomenclature in jazz idiom.

Mus 5390. Jazz Singers. (1 cr [max 10 cr]; A-F only. Prereq–Audition, #)
Study and performance of representative vocal jazz literature.

Mus 5410. University Wind Bands. (1 cr [max 14 cr]; A-F only. Prereq–Audition, #)
Wind ensemble and symphony bands perform standard and contemporary literature; concerts and tour appearances. Players from all colleges may participate.

Mus 5415. Literature for Band and Wind Ensemble. (2 cr; A-F only)
Ensemble literature for winds and percussion; analysis and study of repertoire from classical period to the present.

Mus 5420. Orchestra. (1 cr [max 8 cr]; A-F only. Prereq–Audition, #)
Symphony orchestra performs standard repertory and major works with chorus; concerts and tour appearances. Players from all colleges may participate.

Mus 5421. Suzuki Violin Pedagogy I. (2 cr; A-F only. Prereq–Violin major or #)
Philosophy and teaching techniques of Japanese pedagogue Shinichi Suzuki and their applications in Western culture. Discussion, playing experience, and observation of children's lessons in the MacPhail Center Suzuki Program.

Mus 5422. Suzuki Violin Pedagogy II. (2 cr; A-F only. Prereq–5421 or #)
Philosophy and teaching techniques of Japanese pedagogue Shinichi Suzuki and their applications in Western culture. Discussion, playing experience, and observation of children's lessons in the MacPhail Center Suzuki Program.

Mus 5423. Suzuki Pedagogy Practicum. (1 cr [max 1 cr]; A-F only. Prereq–[[¶5424 or ¶5425], grad music student] or #)
Supervised teaching of both individual and group lessons. Instructor provides periodic critiques from observation of live or videotaped lessons.

Mus 5424. Advanced Suzuki Violin Pedagogy I. (2 cr; A-F only. Prereq–5422 or #)
Intensive examination of Suzuki techniques for intermediate and advanced violin students in Western society. Discussion, playing experience, observation of children's lessons in the MacPhail Center Suzuki Program, and practical teaching experience.

Mus 5425. Advanced Suzuki Violin Pedagogy II. (2 cr; A-F only. Prereq–5424 or #)
Intensive examination of Suzuki techniques for intermediate and advanced violin students in Western society. Discussion, playing experience, observation of children's lessons in the MacPhail Center Suzuki Program, and practical teaching experience.

Mus 5426. Final Project in Suzuki Pedagogy. (1 cr; A-F only. Prereq–Grad music student in Violin Performance and Suzuki Pedagogy Program)
Research project.

Mus 5427. Violin Pedagogy I. (2 cr; A-F only. Prereq–Violin or viola major or #)
Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques.

Mus 5428. Violin Pedagogy II. (2 cr; A-F only. Prereq–Violin or viola major or #)
Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques.

Mus 5430. Concerto Grosso Ensemble. (1 cr [max 8 cr]; A-F only. Prereq–Audition, #)
Study and performance of string orchestra and small chamber orchestra literature.

Mus 5440. Chamber Ensemble. (1 cr [max 8 cr]; A-F only. Prereq–Audition, #)
Performance of chamber music; duos, trios, quartets, quintets, and other ensemble combinations for instruments and/or voices.

Mus 5450. Orchestral Repertoire. (1 cr [max 3 cr]; A-F only. Prereq–#)
Investigation of practical and performance problems in standard orchestral repertoire with regard to style and interpretation.

Mus 5464. Cello Pedagogy. (2 cr; A-F only)
Concentrated study of cello teaching methods. Provides students with the strategies for teaching cello privately, develops analytical skills, and increases knowledge of cello repertoire. For practical application in conjunction with string technique course.

Mus 5466. Guitar Pedagogy. (2 cr; A-F only. Prereq–Guitar principal or major or #)
Historical survey of methods and etudes from late 18th century to present, reflecting variety of content and approach. Works by Aguado, Sor, Giuliani, Tarrega, Segovia, Carlevaro, Duncan, Iznaola, Dodgson, and Brindle.

Mus 5470. Woodwind Chamber Ensemble. (1 cr [max 8 cr]; A-F only. Prereq–Audition, #)
Chamber music performance using homogeneous or mixed combinations of woodwind instruments.

Mus 5471. Woodwind Literature and Pedagogy I. (3 cr; A-F only. Prereq–Music major or #)
A study of the major teaching materials for the five woodwind instruments including methods, duets, and solos used primarily for pedagogical reasons.

Mus 5472. Woodwind Literature and Pedagogy II. (3 cr; A-F only. Prereq–Music major or #)
A study of chamber music involving one or more woodwind instruments. May include additional instruments such as piano, strings, and/or voice.

Mus 5473. History and Acoustics of Single Reed Instruments. (2 cr; A-F only. Prereq–Music major or #)
Study of clarinet and saxophone history and literature, mechanical design and development, acoustics, modern schools of performance, selected teaching and performance techniques.

Mus 5480. University Brass Choir. (1 cr [max 8 cr]. Prereq–Audition, #)
The University Brass Choir is an ensemble of 16 brass and percussion players exploring unique literature that spans 400 years. From the rich antiphonal music of Giovanni Gabrieli (1557-1612) to the works of the 20th century. The Brass Choir performs in Twin Cities churches and concert halls.

Mus 5481. Trumpet Pedagogy. (2 cr. Prereq–Sr or grad in music or #)
Principles of trumpet pedagogy. Discussion of literature, history, and current teaching aids.

Mus 5485. Transcription for Winds. (2 cr. Prereq–3502 or #)
Principles of music manuscript and examination of transcription examples. Transcription projects with score and parts. Smaller projects that involve arrangements and original compositions.

Mus 5490. Percussion Ensemble. (1 cr [max 10 cr]; A-F only. Prereq–#)
Practice and performance of standard and contemporary compositions for percussion instruments in various combinations.

Mus 5491. Percussion Literature I. (2 cr; A-F only. Prereq–Jr or sr or grad or #)
Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.

Mus 5492. Percussion Literature II. (2 cr; A-F only. Prereq–Jr or sr or grad or #)
Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.

Mus 5501. Intensive Theory and Analysis of 20th-Century Music. (4 cr; A-F only. Prereq–3502 or #)
Designed for music majors only, the course is comprised of an intensive introduction to the theory and analysis of art music in various styles developed during the 20th century.

Mus 5533. Music Since 1945. (3 cr; A-F only. Prereq–3502, #)
Examine procedures and techniques of music composed since 1945. Integral serialism, sound mass, electronic music, indeterminancy, improvisation, and minimalism in the works of Babbitt, Ligeti, Davidovsky, Oliveros, Cage, Riley, and Reich.

Mus 5541. Counterpoint I. (3 cr; A-F only. Prereq–3501, 3511 or #)
Practice writing in polyphonic styles of Renaissance and Baroque; species counterpoint, canonic and fugal, and other imitative procedures. Study representative forms: motets, inventions, fugues, and chorale-based idioms. Analysis of works by Lassus, Palestrina, Victoria, Purcell, Buxtehude, Fischer, and Bach.

Mus 5542. Counterpoint II. (4 cr; A-F only. Prereq–5541)
Advanced writing in three and more voice polyphonic styles of Renaissance and Baroque. Analyze works of such composers as Lassus, Palestrina, and Bach; emphasis on canonic and fugal procedures.

Mus 5550. Composition. (2 cr [max 8 cr]; A-F only. Prereq–3502 or equiv, 3551 or grad, #)
Original works in various forms. Development of individual compositional style in a post-tonal idiom. Exploration of a variety of forms, performing forces, and techniques.

Mus 5561. Orchestration I. (3 cr; A-F only. Prereq–3502)
Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries.

Mus 5562. Orchestration II. (3 cr; A-F only. Prereq–5561)
Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries.

Mus 5571. Schenkerian Analysis for Performers. (3 cr; A-F only. Prereq–3502)
Theory/analysis of tonal music using principles developed by Henrich Schenker. Basic concepts/notation, their application to excerpts/short pieces from 18th/19th centuries.

Mus 5572. Chromaticism in Tonal Music. (3 cr. Prereq–3502)
Exploration of chromatic tonal practices through analysis of selected repertoire, completion of written exercises (figured bass, harmonization of melodies, model composition), ear-training, and keyboard exercises.

Mus 5591. Electronic Music: History, Literature, Principles. (3 cr; A-F only. Prereq–#, at least jr)
In-depth survey of electroacoustic music repertoire, from tape/analog music through computer-generated compositions. Basic principles of acoustics, electronic sound generation/manipulation, digital signal processing techniques. Programming languages for digital sound synthesis. Work with editing software, MIDI applications.

Mus 5592. Digital Music Synthesis and Processing Techniques. (3 cr; A-F only. Prereq– 5591 or #)
Study of specific dsp topics such as filtering, formant synthesis, reverberation techniques, and additive synthesis. Work with interactive MIDI applications.

Mus 5597. Music and Text. (3 cr; A-F only. Prereq–3502)
Designed for music majors only, this course gives an introduction to the analysis of music with texts such as art song and opera.

Mus 5611. Resources for Music Research. (3 cr; A-F only. Prereq–3603)
Development of skills in identifying, locating, and evaluating resources for research in music. Computer-searching techniques, acquaintance with basic reference sources in the field, preparation of the music research paper.

Mus 5613. Music History Review for Graduate Students. (3 cr; S-N only. Prereq–Grad music major, assigned by placement exam; cannot be applied toward requirements for any music degree program)
History of European art-music tradition and its social contexts from antiquity to 1750: composers, styles, structures, social institutions.

Mus 5614. Music History Review for Graduate Students II. (3 cr; S-N only. Prereq–Grad music major, assigned by placement exam; cannot be applied toward requirements for any music degree program)
History of European art-music tradition and its social contexts from 1750 to present: composers, styles, structures, social institutions.

Mus 5620. Topics in Opera History. (3 cr [max 6 cr]; A-F only. Prereq–grad music major or #)
Through the study of specific operas, students will examine the ways in which intersections of geography, politics, and musical style influenced and perpetuated operatic production within specific geographical and chronological boundaries. Periods/countries will vary each semester.

Mus 5644. Music in 20th-Century American Culture. (3 cr; A-F only. Prereq–3603, 5501 or #)
Stylistic and cultural bases of cultivated and vernacular traditions and their intersections. Topics include folk and ethnic musics, ragtime, city blues and jazz, rock, musical theater, impact of technology, modernism, nationalism, new accessibility.

Mus 5647. 20th-Century European/American Music. (3 cr. Prereq–3603 or equiv, 5501 or equiv, 12 undergrad cr in music history)
Emphasizes major artistic movements, stylistic turning points, social roles of music. Interactions between high art, popular, ethnic musics; contributions of men and woman as composers and performers.

Mus 5658. History of the Symphony in the 20th Century. (3 cr; A-F only. Prereq–3603, 5501 or #)
History of symphony (and related genres) in Europe and America, ca. 1890 to present. Changing aesthetic concerns, structural, harmonic, and timbral innovations. Sociocultural contexts; analysis and criticism.

Mus 5666. Stravinsky. (3 cr; A-F only. Prereq–5502, 12 cr music history)
Analysis and criticism of representative works; aesthetic concerns as expressed in writings of Stravinsky and others; influence upon European and American composers; biographical issues and contributions to artistic life, particularly the ballet.

Mus 5668. Beethoven's Symphonies. (3 cr; A-F only. Prereq–3603, #)
Analytical overview of selected movements from Beethoven's 9 symphonies. Principles of sonata analysis (norm and deformation); introduction to wider contexts of interpretation and understanding (generic, expressive, social).

Mus 5804. Folk and Traditional Musics: Selected Cultures of the World. (3 cr; A-F only. Prereq–1801 or 1804 or music grad or #)
A study of selected music traditions from 5 to 7 world cultures. Genres, social institutions, concepts, styles, instruments, and usages.

Mus 5950. Topics in Music. (1-4 cr [max 15 cr])
Each offering focuses on a single topic. Topics specified in *Class Schedule*.

Mus 5993. Directed Studies. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Music Applied (MusA)

School of Music

College of Liberal Arts

Note: MusA 1101 through MusA 1123 are private instruction and include the following: (2 cr [max 16 cr]; A-F only. Prereq–Audition, Δ).

MusA 1101. Piano—Elective.

MusA 1102. Harpsichord—Elective.

MusA 1103. Organ—Elective.

MusA 1104. Voice—Elective.

MusA 1105. Violin—Elective.

MusA 1106. Viola—Elective.

MusA 1107. Cello—Elective.

MusA 1108. Double Bass—Elective.
MusA 1109. Flute—Elective.
MusA 1111. Oboe—Elective.
MusA 1112. Clarinet—Elective.
MusA 1113. Saxophone—Elective.
MusA 1114. Bassoon—Elective.
MusA 1115. French Horn—Elective.
MusA 1116. Trumpet—Elective.
MusA 1117. Trombone—Elective.
MusA 1118. Euphonium—Elective.
MusA 1119. Tuba—Elective.
MusA 1121. Percussion—Elective.
MusA 1122. Harp—Elective.
MusA 1123. Guitar—Elective.

Note: MusA 1301 through MusA 1523 are private instruction and, unless otherwise noted, include the following: (2-4 cr [max 16 cr]; A-F only. Prereq–Audition, Δ).

MusA 1301. Piano—Major.
MusA 1302. Harpsichord—Major.
MusA 1303. Organ—Major.
MusA 1304. Voice—Major.
MusA 1305. Violin—Major.
MusA 1306. Viola—Major.
MusA 1307. Cello—Major.
MusA 1308. Double Bass—Major.
MusA 1309. Flute-Major.
MusA 1311. Oboe—Major.
MusA 1312. Clarinet—Major.
MusA 1313. Saxophone—Major.
MusA 1314. Bassoon—Major.
MusA 1315. French Horn—Major.
MusA 1316. Trumpet—Major.
MusA 1317. Trombone—Major.
MusA 1318. Euphonium—Major.
MusA 1319. Tuba—Major.
MusA 1321. Percussion—Major.
MusA 1322. Harp—Major.
MusA 1323. Guitar—Major.
MusA 1401. Piano—Secondary. (2-4 cr [max 16 cr]; A-F only. Prereq–Music major, Δ)
MusA 1402. Harpsichord—Secondary.
MusA 1403. Organ—Secondary.
MusA 1404. Voice—Secondary.
MusA 1405. Violin—Secondary.
MusA 1406. Viola—Secondary.
MusA 1407. Cello—Secondary.
MusA 1408. Double Bass—Secondary.
MusA 1409. Flute—Secondary.
MusA 1411. Oboe—Secondary.
MusA 1412. Clarinet—Secondary.
MusA 1413. Saxophone—Secondary.
MusA 1414. Bassoon—Secondary.
MusA 1415. French Horn—Secondary.
MusA 1416. Trumpet—Secondary.
MusA 1417. Trombone—Secondary.
MusA 1418. Euphonium—Secondary.
MusA 1419. Tuba—Secondary.
MusA 1421. Percussion—Secondary.
MusA 1422. Harp—Secondary.
MusA 1423. Guitar—Secondary.
MusA 1501. Piano—Major.
MusA 1502. Harpsichord—Major.
MusA 1503. Organ—Major.
MusA 1504. Voice—Major.
MusA 1505. Violin—Major.
MusA 1506. Viola—Major.
MusA 1507. Cello—Major.
MusA 1508. Double Bass—Major.
MusA 1509. Flute—Major.
MusA 1511. Oboe—Major.
MusA 1512. Clarinet—Major.
MusA 1513. Saxophone—Major.
MusA 1514. Bassoon—Major.
MusA 1515. French Horn—Major.
MusA 1516. Trumpet—Major.
MusA 1517. Trombone—Major.
MusA 1518. Euphonium—Major. (2-4 cr. Prereq–Audition, Δ)
MusA 1519. Tuba—Major.
MusA 1521. Percussion—Major.
MusA 1522. Harp—Major.
MusA 1523. Guitar—Major.

Note: MusA 1901 through MusA 1923 are private instruction for transfer students, one semester only and include the following: (2-4 cr; A-F only. Prereq–Audition, Δ).

MusA 1901. Piano—Transfer.
MusA 1902. Harpsichord—Transfer.
MusA 1903. Organ—Transfer.
MusA 1904. Voice—Transfer.
MusA 1905. Violin—Transfer.
MusA 1906. Viola—Transfer.
MusA 1907. Cello—Transfer.
MusA 1908. Double Bass—Transfer.
MusA 1909. Flute—Transfer.
MusA 1911. Oboe—Transfer.
MusA 1912. Clarinet—Transfer.
MusA 1913. Saxophone—Transfer.
MusA 1914. Bassoon—Transfer.
MusA 1915. French Horn—Transfer.
MusA 1916. Trumpet—Transfer.
MusA 1917. Trombone—Transfer.
MusA 1918. Euphonium—Transfer.
MusA 1919. Tuba—Transfer.
MusA 1921. Percussion—Transfer.
MusA 1922. Harp—Transfer.
MusA 1923. Guitar—Transfer.

Note: MusA 2301 through MusA 2323 are private instruction and include the following: (2-4 cr [max 16 cr]; A-F only. Prereq–Audition, Δ).

MusA 2301. Piano—Performance Major.
MusA 2302. Harpsichord—Performance Major.
MusA 2303. Organ—Performance Major.
MusA 2304. Voice—Performance Major.
MusA 2305. Violin—Performance Major.
MusA 2306. Viola—Performance Major.
MusA 2307. Cello—Performance Major.
MusA 2308. Double Bass—Performance Major.
MusA 2309. Flute—Performance Major.
MusA 2311. Oboe—Performance Major.
MusA 2312. Clarinet—Performance Major.
MusA 2313. Saxophone—Performance Major.
MusA 2314. Bassoon—Performance Major.
MusA 2315. French Horn—Performance Major.
MusA 2316. Trumpet—Performance Major.
MusA 2317. Trombone—Performance Major.
MusA 2318. Euphonium—Performance Major. (2-4 cr. Prereq–Audition, Δ)
MusA 2319. Tuba—Performance Major.
MusA 2321. Percussion—Performance Major.
MusA 2322. Harp—Performance Major.
MusA 2323. Guitar—Performance Major.

Note: MusA 3101 through MusA 3123 are private instruction and include the following: (2 cr [max 8 cr]; A-F only. Prereq–Audition, Δ).

MusA 3101. Piano—Elective.
MusA 3102. Harpsichord—Elective.
MusA 3103. Organ—Elective.
MusA 3104. Voice—Elective.
MusA 3105. Violin—Elective.
MusA 3106. Viola—Elective.
MusA 3107. Cello—Elective.
MusA 3108. Double Bass—Elective.
MusA 3109. Flute—Elective.
MusA 3111. Oboe—Elective.
MusA 3112. Clarinet—Elective.
MusA 3113. Saxophone—Elective.
MusA 3114. Bassoon—Elective.
MusA 3115. French Horn—Elective.
MusA 3116. Trumpet—Elective.
MusA 3117. Trombone—Elective.
MusA 3118. Euphonium—Elective.
MusA 3119. Tuba—Elective.
MusA 3121. Percussion—Elective.
MusA 3122. Harp—Elective.
MusA 3123. Guitar—Elective.

Note: MusA 3301 through MusA 3309 are private instruction and include the following: (2-4 cr [max 16 cr]; A-F only. Prereq–Audition, Δ).

MusA 3301. Piano—Major.
MusA 3302. Harpsichord—Major.
MusA 3303. Organ—Major.
MusA 3304. Voice—Major.
MusA 3305. Violin—Major.
MusA 3306. Viola—Major.
MusA 3307. Cello—Major.
MusA 3308. Double Bass—Major.
MusA 3309. Flute—Major.

Note: MusA 3311 through MusA 3323 are private instruction and include the following: (2-4 cr [max 24 cr]; A-F only. Prereq–Audition, Δ).

MusA 3311. Oboe—Major.
MusA 3312. Clarinet—Major.
MusA 3313. Saxophone—Major.
MusA 3314. Bassoon—Major.
MusA 3315. French Horn—Major.
MusA 3316. Trumpet—Major.
MusA 3317. Trombone—Major.
MusA 3318. Euphonium—Major.
MusA 3319. Tuba—Major.
MusA 3321. Percussion—Major.
MusA 3322. Harp—Major.
MusA 3323. Guitar—Major.

Note: MusA 5101 through MusA 5123 are private instruction and include the following: (2 cr [max 8 cr]; A-F only. Prereq–Audition, Δ).

MusA 5101. Piano—Elective.
MusA 5102. Harpsichord—Elective.
MusA 5103. Organ—Elective.
MusA 5104. Voice—Elective.
MusA 5105. Violin—Elective.
MusA 5106. Viola—Elective.
MusA 5107. Cello—Elective.
MusA 5108. Double Bass—Elective.
MusA 5109. Flute—Elective.
MusA 5111. Oboe—Elective.
MusA 5112. Clarinet—Elective.
MusA 5113. Saxophone—Elective.
MusA 5114. Bassoon—Elective.
MusA 5115. French Horn—Elective.
MusA 5116. Trumpet—Elective.

MusA 5117. Trombone—Elective.

MusA 5118. Euphonium—Elective.

MusA 5119. Tuba—Elective.

MusA 5121. Percussion—Elective.

MusA 5122. Harp—Elective.

MusA 5123. Guitar—Elective.

Note: MusA 5401 through MusA 5423 are private instruction and include the following: (2-4 cr [max 24 cr]; A-F only. Prereq–Audition, Δ).

MusA 5401. Piano—Secondary.

MusA 5402. Harpsichord—Secondary.

MusA 5403. Organ—Secondary.

MusA 5404. Voice—Secondary.

MusA 5405. Violin—Secondary.

MusA 5406. Viola—Secondary.

MusA 5407. Cello—Secondary.

MusA 5408. Double Bass—Secondary.

MusA 5409. Flute—Secondary.

MusA 5411. Oboe—Secondary.

MusA 5412. Clarinet—Secondary.

MusA 5413. Saxophone—Secondary.

MusA 5414. Bassoon—Secondary.

MusA 5415. French Horn—Secondary. (2-4 cr. Prereq–Audition, Δ)

MusA 5416. Trumpet—Secondary.

MusA 5417. Trombone—Secondary.

MusA 5418. Baritone—Secondary.

MusA 5419. Tuba—Secondary.

MusA 5421. Percussion—Secondary.

MusA 5422. Harp—Secondary.

MusA 5423. Guitar—Secondary.

Music Education (MuEd)

School of Music

College of Liberal Arts

MuEd 1201. Introduction to Music Education. (1 cr; A-F only)
Orientation to the profession of music education through in-school observations, readings, presentations, and self-reflection. Introduction to technology for music educators.

MuEd 1801. Introduction to Music Therapy. (2 cr; A-F only)
Methods, materials, and applications of music therapy in various clinical settings with emphasis on field observation.

MuEd 3301. Teaching Elementary Vocal and General Music. (3 cr; A-F only. Prereq–Music ed major)
Methods, materials, curriculum development, principals of learning, the child voice, rhythm, music reading, history, appreciation, listening, creativity, classroom instruments, and applications of technology for elementary school classroom music.

MuEd 3350. Student Teaching in Classroom Music. (4-8 cr [max 8 cr]; A-F only. Prereq–Music ed major, #)
Supervised teaching and observing of classroom and general music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

MuEd 3415. Choral Conducting and Methods I. (4 cr; A-F only. Prereq–Music ed major or music therapy major or #)
Development of basic choral conducting skills and rehearsal techniques. Diction for singing. Repertoire/arranging for various choral ensembles. Strategies/methods for teaching secondary general music, including interdisciplinary issues, keyboard, and guitar. The adolescent voice. Applications of technology.

MuEd 3416. Choral Conducting and Methods II. (4 cr; A-F only. Prereq–Music ed major or #)
Development of choral conducting skills and rehearsal techniques. Emphasizes interpretation of choral compositions. Methods, materials, and curriculum for school choral ensembles. Diction for singing. Secondary general music methodology.

MuEd 3450. Student Teaching in Vocal Music. (4-8 cr [max 8 cr]; A-F only. Prereq–Music ed major, #)
Supervised teaching and observing of vocal music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

MuEd 3502. String Techniques and Teaching. (2 cr; A-F only. Prereq–Music ed major or #)
Playing experience on orchestral string instruments; historical and acoustical background; scoring for strings; principles of improvisation; basic concepts of teaching; methods and materials; techniques of individual and class instruction.

MuEd 3503. Woodwind Techniques and Teaching. (2 cr [max 3 cr]; A-F only. Prereq–Music ed major or #)
Playing experience on instruments of the woodwind family; historical and acoustical background; scoring for brasses; principles of improvisation; basic concepts of teaching; methods and materials; class instruction.

MuEd 3504. Brass Techniques and Teaching. (2 cr; A-F only. Prereq–Music ed major or #)
Playing experience on instruments of the brass family; historical and acoustical background; scoring for brasses; principles of improvisation; basic concepts of teaching; methods and materials; class instruction.

MuEd 3505. Percussion Techniques and Teaching. (2 cr; A-F only. Prereq–Music ed major or #)
Playing experience on percussion instruments; historical and acoustical background; scoring for percussion; principles of improvisation; basic concepts of teaching; methods and materials; techniques of individual and class instruction.

MuEd 3516. Instrumental Methods and Conducting I. (3 cr; A-F only. Prereq–Music ed major)
Techniques for administering a school instrumental music program. Emphasizes rehearsal techniques, literature, and materials for school use. School-based experiences. Orchestration and arranging.

MuEd 3517. Beginning Instrumental Methods and Materials. (3 cr; A-F only. Prereq–[1201, 3502, 3503, 3504, 3505, 3516, Mus 3401] with at least C-)
Development of skills for teaching beginning instrumentalists.

MuEd 3518. Instrumental Methods and Conducting II. (3 cr; A-F only. Prereq–[1201, 3502, 3503, 3504, 3505, 3516, 3517, Mus 3401] with at least C-)
Students synthesize knowledge/skills to develop/maintain curricular-oriented, comprehensive instrumental music program.

MuEd 3550. Student Teaching in Instrumental Music. (4 8 cr [max 8 cr]; A-F only. Prereq–Music ed major, #)
Supervised teaching and observing of instrumental music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

MuEd 3650. Student Teaching Seminar. (2 cr; A-F only. Prereq–At least C- in all required [music, music education, professional education] courses)
Reflective practice during student teaching. Developing materials for professional employment (e.g., resume, portfolio).

MuEd 3800. Introduction to Clinical Music Therapy Practice. (4 cr; A-F only. Prereq–Music therapy major or #)
Introduction to lab and field studies of music therapy and music behavior. Pre-internship experiences in health, welfare, recreational, and educational settings.

MuEd 3804. Applications of Music Therapy I: Music Therapy for Children in Rehabilitative Settings. (4 cr; A-F only. Prereq–Music therapy major, #)
Examination of specific techniques in quantification of study of music behavior; projects using behavioral observations.

MuEd 3805. Applications of Music Therapy II: Music Therapy in Long Term Care and Psychiatric Care. (4 cr; A-F only. Prereq–Music therapy major or #)
Methods and materials for music therapy in school and hospital settings; designing and implementing programs for severely and moderately handicapped children and adults.

MuEd 3806. Preparing for a Music Therapy Career. (4 cr; A-F only. Prereq–Music therapy major or #)
Identify and explore current controversies, issues, and values encountered in music therapy. Explore and analyze counseling processes and techniques. Students are placed in a health care facility for the term to gain pre-internship experience.

MuEd 3855. Music Therapy Internship. (12 cr; S-N only. Prereq–Music therapy major, #)
Six-month resident internship in music therapy at an affiliated, approved hospital or clinic.

MuEd 5011. Music in the Elementary Classroom Curriculum. (2 cr. Prereq–Mus 1001, elem ed major grad)
Overview of the fundamentals of music, methods, and materials for incorporating singing, rhythmic activities, classroom instruments, movement, listening, appreciation, and creation into the context of classroom curriculum.

MuEd 5112. Research in Music Education: Techniques. (3 cr; A-F only. Prereq–Grad music ed major or #)
Methods and techniques employed in investigating and reporting music education problems; proposal development; bibliographic skills involved in conducting a significant review of related research.

MuEd 5115. Research in Music Education: Measurement. (3 cr; A-F only)
Assessment of music behaviors, including test design, interpretation of test results, and evaluation and reporting of student achievement; published tests in music; uses of assessment and measurement in the classroom and in research.

MuEd 5211. Foundations of Music Education. (3 cr; A-F only)
An overview of the historical, philosophical, and psychological foundations of music education.

MuEd 5313. Youth Music: Preferences, Influences, and Uses. (2 cr; A-F only)
Youth music preferences and their determinants; how music influences youth behavior; students' and teachers' uses of commercial styles. Particularly appropriate for educators and parents.

MuEd 5433. Techniques and Materials: Choral Ensembles. (2 cr; A-F only. Prereq–Music or music ed major or #)
Research and literature on vocal and choral music education; choral curriculum issues; repertoire selection; rehearsal techniques.

MuEd 5606. Movement-Based Methods for Music Education. (2 cr; A-F only. Prereq–Music or music ed major or #)
Participation in movement activities; study of Dalcroze philosophy and techniques; applications of movement to music education; examination of research.

MuEd 5611. Teaching Music With Related Arts. (2 cr; A-F only)
Methods and materials for teaching music in cultural context including other art forms.

MuEd 5647. Teaching the Percussion Instruments. (2 cr; A-F only)
Contemporary approaches for teaching percussion in the schools; development of curricular materials and practice in performance techniques.

MuEd 5655. New Dimensions in Music Education. (2 cr; A-F only)
Analysis of recent curricular trends and current issues.

MuEd 5664. Teaching Music on the Internet. (3 cr; A-F only)
Home page development techniques, investigation of software and materials, audio and video utilities, and research applications.

MuEd 5667. Computer-Based Music Instruction. (3 cr; A-F only. Prereq–Music or music ed major or #)
Design and development of computer applications for the music classroom. Creating interactive audio and video presentations for music theory, ear training, composition, analysis, music history, and appreciation.

MuEd 5668. Computerized Music Notation. (3 cr [max 6 cr])
Fundamentals of music notation and printing utilizing the computer, MIDI keyboards, and Finale software program. Preparation of instrumental and vocal scores, part extraction and page layout. Basic techniques for sequencing and transcription.

MuEd 5669. Psychology of Music. (3 cr; A-F only. Prereq–Psy 1001 or Psy 3604 or #)
Basic study of the psychology and psychoacoustics of music including hearing, music perception and cognition, values and preferences, musical abilities, musical systems, media music effects, the influence of music on human behavior, and psycho-socio-physiological processes involved in musical behavior.

MuEd 5750. Topics in Music Education. (1-4 cr [max 8 cr]; A-F only)
Each offering focuses on a single topic. Topics specified in *Class Schedule.*

MuEd 5991. Independent Study. (1-4 cr [max 8 cr]; A-F only. Prereq–Music ed or music therapy major or grad, #, Δ)
Independent study project organized by the student in consultation with the appropriate instructor.

Natural Resources and Environmental Studies (NRES)

Department of Forest Resources

College of Natural Resources

NRES 1001. Orientation and Information Systems. (1 cr; A-F only)
Academic planning, natural resource careers, liberal education requirements, internships, summer jobs, mentoring. Utilizing alumni contacts. Leadership, organization, and process in natural resources. Information technology tools in workplace, lab equipment, software. Navigating the Internet. Preparing documents. Making spreadsheet calculations. Using Lumina and periodical indexes.

NRES 1002. Freshman Seminar. (1-3 cr. Prereq–Fr)
In-depth study of issues/topics related to natural resources and the environment. Topics vary and are announced each semester.

NRES 1041W. Natural Resources as Raw Materials. (3 cr)
Trends in national/global population growth, economic growth, and consumption of food, energy, minerals, wood, and other raw materials. Natural resources as raw materials for industry and for economic development. Environmental/economic trade-offs in gathering, processing, and use. Balancing consumption and environmental needs. Environmental impacts of extraction/use. Sustainability.

NRES 1201. Conservation of Natural Resources. (3 cr; A-F only)
Issues/approaches in conserving/managing natural resources locally, in the Midwest, United States, and globally. Concepts of ecology. Current issues/approaches in conserving/managing renewable natural resources. Environmental ethics, conservation economics. Soil, forests, wildlife, fisheries, wind/solar power.

NRES 1480. Topics in Natural Resources. (1-4 cr [max 6 cr])
Lectures by visiting scholar or regular staff member. Topics specified in *Class Schedule.*

NRES 1905. Freshman Seminar. (1-3 cr)
In-depth study of issues/topics related to natural resources and the environment. Topics vary and are announced each semester.

NRES 3000. Colloquium: Natural Resources and Environmental Studies. (1 cr [max 6 cr]; A-F only)
Lectures from experts. Readings/discussions of current environmental topics/issues. Topics vary, see *Class Schedule.*

NRES 3001. Colloquium: Perspectives on Treaty Rights. (2 cr; A-F only)
Readings, class discussion about nature of treaty rights reserved by indigenous Americans with respect to utilization of natural resources. Emphasizes Midwest issues. Web-assisted course. Meets with 5001.

NRES 3002. Colloquium: Exotic Plants and Animals. (1 cr; A-F only)
Current exotic plants/animals in Great Lakes region and around the world. Gypsy moths, brown tree snakes, zebra mussels, Eurasian watermilfoil. Impact/control. Readings, discussions, and lectures from experts on topics such as invasion theory and real world management.

NRES 3003H. Honors Colloquium. (1 cr [max 2 cr]; A-F only. Prereq–[Fr or soph], CNR honors, #)
Lectures from experts, readings, discussions of current environmental topics/issues. Topics vary, see *Class Schedule.*

NRES 3011W. Ethics, Conflict, and Leadership in Resource Management. (3 cr)
Normative ethics/leadership considerations applicable to managing natural resources/environment. Readings, discussion.

NRES 3021. Plant Resource Management and the Environment. (3 cr. Prereq–Biol 3008 or EEB 3001 or FR 3104 or #)
Application of ecological concepts such as succession/competition to ecosystems under management. Wetlands, riparian zones, urban interfaces, agriculture, agroforestry. Northern, boreal conifer, and hardwood forests. Grasslands/prairie. Emphasizes management objectives, methods, impacts. Evaluating practices for sustainability. Integrating social issues. Regional (Great Lakes area), national, and global case studies.

NRES 3051. Experience and Training in a Field Setting. (1-3 cr; A-F only. Prereq–#)
Students give oral presentation and produce formal paper/project on topic related to their experience and chosen in consultation with faculty adviser.

NRES 3101. Conservation of Plant Biodiversity. (3 cr; A-F only. Prereq–Biol 1001 or Biol 1009)
Introduction to principles underlying assessment/conservation of plant biodiversity at individual, population, and community levels. Case studies in management of biodiversity to restore/maintain ecosystem function. Issues such as genetics, timber harvesting, invasive species, plant reproduction.

NRES 3202W. Social Change: Dispute Resolution, Leadership, and Partnerships. (3 cr; A-F only)
Negotiation of natural resource management issues. Collaborative planning. Case study approach to conflict management, strategic planning, and building leadership qualities.

NRES 3205. Field Ecology in NRES. (4 cr. Prereq–[Biol 1001 or Biol 1009], [Biol 3407 or FR 3104 or equiv])
Field introduction to upland terrestrial, wetland, aquatic habitats of northern Minnesota, their ecological processes, and aspects of management. Identification of common plants, animals, and soils. Application of field techniques. Group problem-solving. Held at Cloquet Forestry Center.

NRES 3211. Survey, Measurements, and Modeling in Natural Resources. (3 cr. Prereq–[Math 1142 or Math 1271], Stat 3011)
Introduction to survey, measurement, and modeling concepts/methods for study of natural resources and environmental issues. Emphasizes survey design for data collection, estimation, and analysis for issues encompassing land, water, air, vegetation, animal, soil, and human/social variables. Practical examples.

NRES 3241W. Natural Resource Policy and Administration. (3 cr. Prereq–ApEc 1101 or Econ 1101)
Political/administrative concepts for natural resources and environmental policy/program development. Case study approach. Policy/legislative process, participants in policy development, public programs. Federal/state laws/regulations, international issues.

NRES 3245. Recreation Policy and Landscape-Level Planning. (3 cr; A-F only. Prereq–All lower div RRM reqs)
Overview of policies that affect recreation at local, state, and federal levels. Landscape-level planning. Collaborative relationships as means to implement sustainable natural/social policy. Class project involves all aspects of implementing recreation policy, from public meetings to hands-on evaluation of options.

NRES 3261W. Economics and Natural Resources Management. (4 cr; A-F only)
Introduction to microeconomic principles. Relationship of economic principles to natural resource management. Tools to address market failure, project analysis. Economic/financial considerations. Benefit/cost analysis. Valuation/assessment methods for property/resources. Planning/management problems. Managing renewable natural resources.

NRES 3480. Topics in Natural Resources. (1-4 cr [max 6 cr])
Lectures by visiting scholar or regular staff member. Topics specified in *Class Schedule.*

NRES 3575. Wetlands Conservation. (3 cr. §5575)
Freshwater wetland classification, wetland biota, current/historic status of wetlands, value of wetlands. National, regional, Minnesota wetlands conservation strategies, ecological principles used in wetland management.

NRES 3601. Our Home, Our Environment. (3 cr; A-F only)
Effects of people and their homes on the environment. Energy/resource efficiency, environmental responsibility, occupant health. Affordability issues with respect to housing. Design, construction, renovation, retrofitting, landscaping. Consumer options for lighting, weatherization, water use, emissions, waste reduction, recycling, air quality, hazardous materials, and housing growth.

NRES 4061. Water Quality: Management of a Natural Resource. (3 cr. Prereq–Grad student)
Biophysical water quality in context of today's management concerns. Global/ecological perspectives for managing surface/groundwater resources. Active learning approaches.

NRES 4061W. Water Quality: Management of a Natural Resource. (3 cr)
Issues, parameters, and decision making strategies for managing surface/groundwater resources in Minnesota and globally. Biophysical and human side of water management. Wetlands, exotic species, heavy metal deposition. Cultural, political, and societal dimensions. Case studies, discussions, problem-solving, debates, projects.

NRES 4062. Advanced Water Quality. (3 cr. Prereq–[3061, EEB 4601, CE 4541] or #)
Problem based approach to water quality assessment, designing a monitoring/communication program. Field/lab portions: conduct, interpret, and report water quality chemical, physical, and biological variables in an on-campus stream-wetland complex.

For definitions of course numbers, symbols, and abbreviations, see page 296.

NRES 4195W. Problem Solving in Natural Resources and Environmental Studies. (4 cr; A-F only. Prereq–[[3211, all core courses, NRES, 8 cr in area of concentration] or [3245, FR 3131, FR 4232, RRM], sr)
Applying problem solving tools/skills in policy, planning, and managerial situations. Students work with 'real world' client, produce publishable technical report, and present results of their work in a professional public forum.

NRES 4200H. Honors Seminar. (1 cr; A-F only. Prereq–NRES upper div honors, #)
Topics presented by faculty, students, guest speakers. Lecture/discussion.

NRES 4211. Survey, Measurements, and Modeling in Natural Resources. (3 cr. Prereq–[Math 1142 or Math 1271], Stat 3011)
Survey design for data collection. Estimation. Analysis for variables. Issues encompassing land, water, air, vegetation, animal, soil, and human/social variables. Practical examples.

NRES 4293. Directed Study. (1-5 cr [max 12 cr]. Prereq–#)
Student selects and conducts a study of or project on a topic of personal interest in consultation with faculty member. The course is documented by initial proposal and reports of accomplishment.

NRES 4295W. GIS for Problem Solving in Environmental Science and Management. (4 cr; A-F only. Prereq–FR 3131 or #)
Application of spatial data inventory/analysis in complex environmental planning problems. Data collection, database development. GPS, DLG, TIGER, NWI data, spatial analysis. Topics identified by non-University partners.

NRES 4801H. Honors Research. (2 cr; A-F only. Prereq–NRES upper div honors, #)
Independent research project supervised by faculty member.

NRES 4802H. Honors Research. (2 cr; A-F only. Prereq–NRES upper div honors, #)
Completion of honors thesis. Oral report.

NRES 4811. Natural Resources Interpretation. (3 cr; A-F only. Prereq–Jr or sr or grad student)
Theories of interpretation. Nonformal teaching pedagogy. Interpretive talks, walks, and programs. Camp leadership, oral presentation. Newsletter development, Web site design. Development of self-guided trail guides, brochures, and exhibits. Planning, evaluation. Interpretive work in private, state, or federal agencies. Hands-on experience.

NRES 5000. Colloquium: Natural Resources and Environmental Studies. (1 cr [max 6 cr]; A-F only)
Lectures from experts, readings, discussions of current environmental topics/issues. Topics vary, see *Class Schedule*.

NRES 5001. Colloquium: Perspectives on Treaty Rights. (2 cr [max 4 cr])
Readings, class discussion about treaty rights reserved by indigenous Americans with respect to use of natural resources. Emphasizes Midwest issues. Web-assisted course. Meets with 3001.

NRES 5002. Colloquium: Restoration of Aquatic Systems. (1 cr)
Stream habitat restoration. Relationship of restoration to natural stream systems. Planning, research, watershed groups, interagency coordination. Management decision process.

NRES 5021. Plant Resource Management and the Environment. (3 cr. Prereq–Grad student or #)
Application of ecological concepts such as succession/competition to ecosystems under management. Wetlands, riparian zones, urban interfaces, agriculture, agroforestry. Northern, boreal, conifer, and hardwood forests. Grasslands/prairie. Management objectives, methods, and impacts. Sustainability, social issues. Regional (Great Lakes area), national, and global case studies.

NRES 5061. Water Quality: Management of a Natural Resource. (3 cr. Prereq–Grad student or #)
Issues, parameters, and decision making for managing surface/groundwater resources in Minnesota and globally. Biophysical/human side of water management. Wetlands, exotic species, heavy metal deposition. Cultural, political, and societal dimensions. Case studies, discussions, problem-solving, debates, projects.

NRES 5062. Advanced Water Quality. (3 cr. Prereq–Grad student or #)
Problem based approach to water quality assessment, designing a monitoring/communication program. Field/lab portions: conduct, interpret, and report water quality chemical, physical, and biological variables in an on-campus stream-wetland complex.

NRES 5101. Conservation of Plant Biodiversity. (3 cr; A-F only. Prereq–Grad student or #)
Introduction to principles underlying assessment/conservation of plant biodiversity at individual, population, and community levels. Case studies in management of biodiversity to restore or maintain ecosystem function. Genetics, timber harvesting, invasive species, plant reproduction.

NRES 5195. Problem Solving in Natural Resources and Environmental Studies. (4 cr; A-F only. Prereq–Grad student or #)
Applying problem solving tools/skills in policy, planning, and managerial situations. Students work with 'real world' client to produce publishable technical report, present results in professional public forum.

NRES 5202. Social Change: Dispute Resolution, Leadership, and Partnerships. (3 cr; A-F only. Prereq–Grad student or #)
Negotiation of natural resource management issues. Collaborative planning. Case study approach to conflict management, strategic planning, and leadership.

NRES 5211. Survey, Measurements, and Modeling in Natural Resources. (3 cr. Prereq–Grad student or #)
Introduction to survey, measurement, and modeling concepts/methods for study of natural resources and environmental issues. Emphasizes survey design for data collection, estimation, and analysis for issues encompassing land, water, air, vegetation, animal, soil, and human/social variables. Practical examples.

NRES 5241. Natural Resource Policy and Administration. (3 cr. Prereq–Grad student or #)
Concepts of political/administrative processes for natural resources and environmental policy/program development. Policy/legislative process. Participants in policy development and public programs. Federal/state laws/regulations, international issues. Case studies.

NRES 5245. Recreation Policy and Landscape-Level Planning. (3 cr; A-F only. Prereq–Grad student or #)
Overview of policies that affect recreation at local, state, and federal levels. Landscape-level planning. Collaborative relationships as means to implement sustainable natural/social policy. Class project involving all aspects of implementing recreation policy, from public meetings to hands-on evaluation of options.

NRES 5261. Economics and Natural Resources Management. (4 cr; A-F only. Prereq–Grad student or #)
Microeconomic principles in natural resource management. Tools to address market failure, project analysis, and evaluation. Economic/financial considerations. Benefit/cost analysis methods/examples. Valuation/assessment methods for property/resources. Managing renewable natural resources.

NRES 5295. GIS for Problem Solving in Environmental Science and Management. (4 cr; A-F only. Prereq–Grad student or #)
Application of spatial data inventory/analysis in complex environmental planning problems. Data collection, database development. GPS, DLG, TIGER, NWI data. Spatial analysis. Topics identified by non-University partners.

NRES 5395. Natural Resources Planning. (4 cr; A-F only. Prereq–Grad student or #)
Natural resource planning for multiple resource uses. Techniques/models for evaluating/assessing trade-offs among alternative management plans. Case studies, laboratory exercises.

NRES 5461. Water Quality: The International Dimension. (3 cr. Prereq–Water resource course)
How culture drives water quality management. How/why management varies among countries. Multinational river basin compacts, policies for international management. Active learning approaches.

NRES 5480. Topics in Natural Resources. (1-4 cr [max 6 cr]. Prereq–Sr or grad student)
Lectures by visiting scholar or regular staff member. Topics specified in *Class Schedule*.

NRES 5482. Biosafety Science and Policy. (3 cr)
Scientific/policy approaches to governing use of new biological technologies, such as genetic engineering and its products (e.g., growth-enhanced, transgenic fish), for equity/safety.

NRES 5575. Wetlands Conservation. (3 cr. §3575. Prereq–Sr or grad student or #)
Freshwater wetland classification, wetland biota, current/historic status of wetlands, value of wetlands. National, regional, Minnesota wetlands conservation strategies. Ecological principles used in wetland management.

NRES 5703. Agroforestry: Role in Watershed Management. (2 cr)
Biological, physical, and environmental aspects. Coupling production with watershed protection. Implications for policy, economics, and human dimensions in sustainable development. Case studies from North America and developing countries.

NRES 5811. Natural Resources Interpretation. (3 cr; A-F only. Prereq–Grad student or #)
Theories of interpretation, nonformal teaching pedagogy. Interpretive talks, walks, and programs. Camp leadership. Oral presentation. Newsletter development. Web site design. Development of self-guided trail guides, brochures, and exhibits. Planning, evaluation. Interpretive work in private, state, or federal agencies. Hands-on experience.

Naval Science (Nav)

Department of Naval Science (Naval ROTC)

Office of the Executive Vice President and Provost

Nav 1000. Professional Training in Naval Science. (1 cr [max 1 cr]; S-N only. Prereq–Fresh enrolled in NROTC)
Instruction and training in basic military subjects and professional development, including military leadership, close order drill, marksmanship, honors and ceremonies, personnel inspections, and computer-based war game simulations. Classes and small group seminars on leadership and ethical issues with case studies.

Nav 1101. Introduction to Naval Science. (3 cr; A-F only)
Navy organization, customs and traditions, officer and enlisted rank and rating structures, uniforms and insignia, shipboard duties, seamanship, damage control, and safety. Core values of the naval services, Navy regulations, and the Uniform Code of Military Justice.

Nav 1102. Seapower and Maritime Affairs. (3 cr; A-F only)
Historical influences on development of U.S. Navy, from American Revolution to present. Critical, contemporary issues.

Nav 2000. Professional Training in Naval Science. (1 cr [max 1 cr]; S-N only. Prereq–Soph enrolled in NROTC)
Instruction and training in basic military subjects and professional development, including military leadership, close order drill, marksmanship, honors and ceremonies, personnel inspections, and computer-based war game simulations. Classes and small group seminars on leadership and ethical issues with case studies.

Nav 2201. Ship Systems I: Naval Engineering. (3 cr; A-F only)
Detailed study of ship characteristics/types. Design, hydrodynamic forces, stability, compartmentation, propulsion, electrical/auxiliary systems, damage control, administration. Basic concepts of theory/design for steam, gas turbine, diesel, nuclear propulsion.

Nav 2202. Ship Systems II: Science and Technology in Naval Weapons Systems. (3 cr; A-F only)
Detection, evaluation, threat analysis, weapon selection, delivery, guidance, explosives. Physical aspects of radar, underwater sound. Facets of command, control, communications as means of weapons system integration.

Nav 3000. Professional Training in Naval Science. (1 cr [max 1 cr]; S-N only. Prereq–Jr enrolled in NROTC)
Instruction and training in basic military subjects and professional development, including military leadership, close order drill, marksmanship, honors and ceremonies, personnel inspections, and computer-based war game simulations. Classes and small group seminars on leadership and ethical issues with case studies.

Nav 3301. Navigation I: Piloting and Celestial Navigation. (3 cr; A-F only)
Theory/practice piloting a ship near land. Coordinate systems, chart reading, dead reckoning, fixes, tides, currents, anchoring. Theory based on observance of celestial bodies.

Nav 3302. Navigation II: Seamanship and Ship Operations. (3 cr; A-F only. Prereq–3301)
National/international nautical rules of the road, seamanship, tactical maneuvering/signaling, relative motion, vector-analysis, formation tactics, ship employment, ship behavior/characteristics. Application of maneuvering board in solving motion problems.

Nav 3310. Evolution of Warfare. (3 cr; A-F only)
Great military leaders of history. Development of warfare, from dawn of recorded history to present. Focuses on effect of major military theorists, strategists, tacticians, technological developments.

Nav 4000. Professional Training in Naval Science. (1 cr [max 1 cr]; S-N only. Prereq–Sr enrolled in NROTC)
Instruction and training in basic military subjects and professional development, including military leadership, close order drill, marksmanship, honors and ceremonies, personnel inspections, and computer-based war game simulations. Classes and small group seminars on leadership and ethical issues with case studies.

Nav 4401. Leadership and Management I. (3 cr; A-F only)
Advanced study of organizational behavior/management. Major behavioral theories examined in detail. Practical applications. Exercises, case studies, seminar discussions.

Nav 4402. Leadership and Ethics. (3 cr; A-F only. Prereq–4401)
Junior officer role. Responsibilities faced as leader, manager, professional officer of Naval Services. Develops specific competencies in areas of leadership, management, professional administration, development. Emphasizes Naval Service ethics, core values.

Nav 4410. Amphibious Warfare. (3 cr; A-F only)
Development of amphibious doctrine, its expansion in Pacific Campaign of World War II. Detailed case studies of Tarawa, Iwo Jima, Okinawa illustrate amphibious planning.

Neuroscience (NSc)

College of Biological Sciences

NSc 4185. Itasca Summer Neurobiology Laboratory. (3 cr; A-F only. Prereq–#, ❑)
Concepts in cellular neurosciences. Basis of membrane properties, including ionic/molecular mechanisms of resting, action, and synaptic potentials. State-of-the-art equipment and contemporary techniques used to examine experimental evidence.

NSc 5031W. Perception. (3 cr. Prereq–Psy 3031 or Psy 3051 or #)
Cognitive, computational, and neuroscience perspectives on visual perception. Color vision, pattern vision, image formation in eye, object recognition, reading, impaired vision. Course is biennial: offered fall of odd years.

NSc 5034. Psychobiology of Vision. (3 cr. Prereq–Psy 3031 or #)
Analysis of the properties and biological bases of visual perception in humans and animals. Emphasis on color vision, visual sensitivity and adaptation, nerve cells and circuits in the eye, structure and function of the visual brain.

NSc 5037. Psychology of Hearing. (3 cr. Prereq–Psy 3031 or #)
Biological and physical aspects of hearing, auditory psychophysics, theories and models of hearing, perception of complex sounds including music and speech, clinical and other applications.

NSc 5201. Computational Neuroscience I: Membranes and Channels. (3 cr. Prereq–Calculus through differential equations)
Comprehensive examination of membrane and ion channels using UNIX workstations to simulate their properties. Hodgkin-Huxley model, nonlinear dynamic systems, voltage- and ligand-gated ion channels, impulse propagation.

NSc 5202. Theoretical Neuroscience: Systems and Information Processing. (3 cr. Prereq–[3101, 3102W] recommended)
Concepts of computational/theoretical neuroscience. Distributed representations and information theory. Methods for single-cell modeling, including compartmental/integrate-and-fire models. Learning rules, including supervised, unsupervised, and reinforcement learning models. Specific systems models from current theoretical neuroscience literature. Lecture/discussion. Readings from current scientific literature.

NSc 5461. Cellular and Molecular Neuroscience. (4 cr; A-F only. Prereq–NSc grad student or #)
Lectures by team of faculty, problem sets in important physiological concepts, discussion of original research papers.

NSc 5462. Neuroscience Principles of Drug Abuse. (2 cr. Prereq–#)
Current research on drugs of abuse, their mechanisms of action, characteristics shared by various agents, and neural systems affected by them. Offered biennially, spring semester of even-numbered years.

NSc 5481. Invertebrate Neurobiology. (2 cr; A-F only. §Ent 5481)
Fundamental principles/concepts underlying cellular bases of behavior and "systems" neuroscience. Particular invertebrate preparations. Offered annually the last 10 weeks of spring semester.

NSc 5561. Systems Neuroscience. (4 cr; A-F only. Prereq–Neuroscience grad student or #)
Principles of organization of neural systems forming the basis for sensation/movement. Sensory-motor/neural-endocrine integration. Relationships between structure and function in nervous system. Team taught. Lecture, laboratory.

NSc 5661. Behavioral Neuroscience. (3 cr; A-F only. Prereq–Grad NSc major or grad NSc minor or #)
Neural coding/representation of movement parameters. Neural mechanisms underlying higher order processes such as memorization, memory scanning, and mental rotation. Emphasizes experimental psychological studies in human subjects, single cell recording experiments in subhuman primates, and artificial neural network modeling.

Neuroscience Department (NSci)

Department of Neuroscience
Medical School

NSci 3101. Introduction to Neuroscience I: From Molecules to Madness. (3 cr; A-F only. §Phsl 3101, §Biol 3101. Prereq–Biol/BioC 3021 or BioC 4331)
Basic principles of cellular/molecular neurobiology and nervous systems.

NSci 3102W. Introduction to Neuroscience II: Biological Basis of Behavior. (3 cr; A-F only. §Phsl 3102, §Biol 3102, §Biol 3102W. Prereq–Biol 3101 or NSc 3101 or Phsl 3101)
Organization of neural systems/subsystems underlying sensory/motor aspects of behavior. Writing intensive.

NSci 4105. Neurobiology Laboratory I. (1.5 cr; A-F only. §Biol 3105, §Biol 4105, §Phsl 3105. Prereq–[3101 or Biol 3101 or Phsl 3101], [3102W or Biol 3102W], #)
Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

NSci 4115. Neurobiology Laboratory II. (1.5 cr; A-F only. §Biol 3115, §Biol 4115, §Phsl 3115. Prereq–[3101 or Biol 3101 or Phsl 3101], [3102W or Biol 3102W], #)
Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

NSci 4151. Advanced Topics in Neuroscience. (3 cr; A-F only. §Phsl 4151. Prereq–Biol/NSci/Phsl 3101 or #)
In-depth study of aspects of neurodevelopment, neurochemistry/molecular neuroscience, sensory systems, motor control, and behavioral neuroscience. Primarily for undergraduates majoring in neuroscience or related areas.

NSci 4793W. Directed Studies: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements)
Individual study of selected topics. Emphasis on readings, use of scientific literature. Writing intensive.

NSci 4794W. Directed Research: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements)
Lab or field investigation of selected areas of research. Writing intensive.

NSci 4993. Directed Studies. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ; max of 7 cr of 4993 and/or 4994 may count toward major requirements)
Individual study of selected topics with emphasis on selected readings and use of scientific literature.

NSci 4994. Directed Research. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ; max of 7 cr of 4993 and/or 4994 may count toward major requirements)
Lab or field investigation of selected areas of research.

NSci 5101. Introduction to Neuroscience for Graduate Students. (3 cr; A-F only. §3101, §Biol 3101, §Phsl 3101. Prereq–[BioC 3021 or BioC 4331], Δ; intended for grad students outside neuroscience program who require comprehensive intro)
Basic principles of cellular/molecular neurobiology and nervous system. A term paper supplements lectures. Multiple-choice exams.

NSci 5110. Dental Neuroscience for Graduate Students. (2 cr; A-F only. Prereq–BioC 3021, Biol 4004, #; intended for grad students who require a comprehensive grad-level neuroscience course)
Structure/function of human nervous system. Lectures and reading assignments emphasize topics pertinent to dentistry.

NSci 5111. Medical Neuroscience for Graduate Students. (4 cr; A-F only. Prereq–BioC 3021, Biol 4004, #; intended for grad students who require a comprehensive medically-oriented neuroscience course)
Survey of molecular, cellular, and systems neuroscience as related to medicine. Lecture/lab.

Norwegian (Nor)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

Nor 1001. Beginning Norwegian. (5 cr)
Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.).

Nor 1002. Beginning Norwegian. (5 cr. Prereq–1001)
Continues the presentation of all four language modalities (listening, reading, speaking, writing) with a proficiency emphasis. Topics include free-time activities, careers, and the Norwegian culture.

Nor 1003. Intermediate Norwegian. (5 cr. Prereq–1002)
Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments.

Nor 1004. Intermediate Norwegian. (5 cr. Prereq–1103)
Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments.

Nor 1010. Online Basic Norwegian. (2 cr [max 8 cr])
Norwegian language/culture. Travel, weather, family, work, school, daily life. Students meet for orientation and midterm, then work at own pace using multimedia Web curriculum. Instructor-student interactions through e-mail, threaded discussions, and audio messages.

Nor 3011. Advanced Norwegian. (4 cr. Prereq–Passing score on GPT)
Designed to help students achieve advanced proficiency in Norwegian. Discussion of fiction, film, journalistic, and professional prose is complemented by grammar and vocabulary building exercises and a systematic review of oral and written modes of communication.

Nor 3012. Advanced Norwegian. (4 cr. Prereq–Passing score on GPT)
Discussion of novels, short stories, plays, articles complemented by structural, stylistic, vocabulary-building exercises.

Nor 4001. Beginning Norwegian. (2 cr. §1001. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Nor 1001; see Nor 1001 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Nor 4002. Beginning Norwegian. (2 cr. §1002. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Nor 1002; see Nor 1002 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Nor 4003. Intermediate Norwegian. (2 cr. §1003. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Nor 1003; see Nor 1003 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Nor 4004. Intermediate Norwegian. (2 cr. §1004. Prereq–Passing score on GPT in another language or grad)
Meets concurrently with Nor 1004; see Nor 1004 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Nursing (Nurs)

School of Nursing

Nurs 1020. Challenge of Nursing. (2 cr; S-N only)
Overview of nursing profession. Contemporary nursing, its historical roots/stages. Career opportunities/challenges.

Nurs 1800. Nursing Topics. (1-4 cr. Prereq–#)
Topics not included in regular courses.

Nurs 3690. Life Span, Growth, and Development I. (2 cr. Prereq–One general psychology and one general biology course or #)
An introductory, multimedia course that incorporates biological, sociological, and psychological perspectives of human life span development from the prenatal period through young adulthood.

Nurs 3691. Life Span, Growth, and Development II. (1 cr. Prereq–3690, one general psychology and one general biology course or #)
An introductory, multimedia course that incorporates biological, sociological, and psychological perspectives of human life span development for the period of young adulthood through aging and the death experience.

Nurs 3800. Nursing Topics. (1-4 cr. Prereq–#)
Topics not included in regular courses.

Nurs 4000. Introduction to Public Health. (2 cr. Prereq–Completed 15 cr)
Health/risk factors of populations. Principles of epidemiology, environmental health applied to selected public health issues. Emphasizes factors that affect health, distribution of health care resources.

Nurs 4100. Introduction to Nursing, Health, and Health Promotion. (5 cr. Prereq–4000, ¶4101, ¶4103, ¶4104)
Nature of nursing/nursing practice and relations among their foundational concepts: health, person, environment. Concepts of health, health assessment, and health promotion for individuals within context of family/community.

Nurs 4101. Clinical Practicum: Health and Health Promotion. (4 cr; A-F only. Prereq–¶4100)
Performing psychomotor skills in standardized physical assessment. Nursing, complementary, and delegated medical interventions in caring for individuals throughout their life span. Health promotion/disease prevention in community groups/facilities or health-focused facilities. Health assessment. Clinic/lab.

Nurs 4103. Therapeutic Communication in Health Care. (3 cr. Prereq–¶4100, ¶4101, ¶4104)
Principles of interpersonal communication with clients/other health professionals. Interacting with clients, families, and communities.

Nurs 4104. Ethical Sensitivity and Reasoning in Health Care. (2 cr. Prereq–[¶4100, ¶4101, ¶4103] or #)
Range/complexity of ethical issues/dilemmas in health care. Ethical concepts, principles, and theories. Addressing specific morally troubling issues in health care settings.

Nurs 4200. Care of Adults With Health Disruptions I: Physiological Conditions. (6 cr. Prereq–[4100, 4101, 4103, 4104, ¶4202, ¶4205, ¶4210] or [¶4210, ¶4302, ¶4306])
Nursing care of adults experiencing acute/chronic physiological disruptive events. Recognizing response patterns. Formulating goals. Applying appropriate interventions. Evaluating client outcomes.

Nurs 4202. Core Interventions for Nursing Practice. (2 cr. Prereq–[¶4200, ¶4205, ¶4210] or [¶4205, ¶4300, ¶4310])
Psychomotor skills in core nursing, complementary, and delegated medical interventions for persons/families, throughout the life span, experiencing health disruptions/developmental transitions.

Nurs 4205. Nursing Theory and Research. (3 cr. Prereq–Undergrad in Nurs, ¶4200, ¶4202, ¶4210 or ¶4202, ¶4300, ¶4310)
Examine knowledge basic to the discipline and practice of nursing. Relationships among research, theory/theoretical formulations, and practice. Research process is introduced with attention to utilization of research in practice.

Nurs 4205V. Honors: Nursing Theory and Research. (3 cr. Prereq–Nurs honors)
Knowledge basic to discipline/practice of nursing. Relationships among research, theory, practice. Introduction to research process, with attention to use of research in practice. Students develop honors research proposal.

Nurs 4205W. Nursing Theory and Research. (3 cr. Prereq–Undergrad in Nurs, ¶4200, ¶4202, ¶4210 or ¶4202, ¶4300, ¶4310)
Examine knowledge basic to the discipline and practice of nursing. Relationships among research, theory/theoretical formulations, and practice. Research process is introduced with attention to utilization of research in practice.

Nurs 4210. Care of Adults with Health Disruptions II: Psychiatric Illnesses. (4 cr. Prereq–4100, 4101, 4103, 4104, ¶4200, ¶4202, ¶4205)
Forming therapeutic relationships with clients experiencing psychiatric illnesses. Collaborating with multidisciplinary team to assess biopsychosocial needs, develop holistic plan of care, help clients negotiate care, and evaluate client outcomes.

Nurs 4300. Family-Centered Nursing Care of Infants, Children, and Adolescents. (6 cr. Prereq–4100, 4101, 4103, 4104, [[¶4202, ¶4205] or [¶4302, ¶4306]], ¶4310)
Caring for children/families when children are acutely or chronically ill. Situations/conditions common to children. Opportunities for practice at hospitals, health care agencies, schools, and community organizations.

Nurs 4302. Expanded Interventions for Nursing Practice. (2 cr. Prereq–4202, 4210, 4300, 4306, [4310 or 4200], 4306)
Building on core interventions for nursing practice to perform psychomotor skills in expanded nursing, complementary, and delegated medical interventions when caring for persons throughout the life span in differing contexts.

Nurs 4306. Health Care Delivery Systems. (3 cr. Prereq–4205, ¶4300, ¶4302, [¶4310 or ¶4200], ¶4210, ¶4306)
Foundation for interpreting structure/processes of health care delivery. Roles of health professionals. Social, economic, technologic, political factors influencing health care quality, access, cost. Ethical implications of health resource use.

Nurs 4310. Holistic Care of Childbearing Families. (4 cr. Prereq–4100, 4101, 4103, 4104, [[¶4202, ¶4205, ¶4300] or [¶4300, ¶4302, ¶4306]])
Nurse's role during antepartum period, birth experience, and immediate postpartum phase. Health promotion, risk reduction, and active participation of clients to achieve optimum family health.

Nurs 4400. Health Care of Populations. (3 cr. Prereq–4200, 4210, 4300, 4302, 4306, 4310, ¶4401, ¶4402, ¶4404, ¶4406, ¶4410)
Synthesize knowledge and skills to promote and protect the health of populations through systematic assessment, planning, intervention, and evaluation. Emphasis on nursing research, roles, public health values, and collaborative activities promoting population health.

Nurs 4401. Health Care of Populations: Clinical Practicum. (2 cr. Prereq–4200, 4210, 4300, 4302, 4306, 4310, ¶4400, ¶4402, ¶4404, ¶4406, ¶4410)
Guided practice in population-based nursing to promote and protect health through systematic assessment, planning, intervention, and evaluation. Critical examination of interdisciplinary collaboration, partnering with culturally diverse populations, and ethical decision-making in public health.

Nurs 4402. Taking Ethical Action in Health Care. (1 cr)
Distribution of scarce resources to meet health care needs in various health care settings. Ethics in a managed care environment. Increasing focus on how to take ethical action in health care.

Nurs 4404. Applied Nursing Research and Research Utilization. (2 cr. Prereq–4205 or #)
Design and carry out a research project of limited scope to develop fundamental skills in systematic inquiry, and interpreting and evaluating research as it applies to nursing practice. The final product is a scholarly research report.

Nurs 4404H. Honors: Applied Research and Research Utilization. (2 cr. Prereq–4205V)
Fundamental skills in systematic inquiry. Interpreting/evaluating research for applicability to nursing practice. Implement study proposed in 4205V. Write report to serve as honors research project or thesis.

Nurs 4406. Leadership and Management for Shaping Professional Nursing Practice. (4 cr. Prereq–4103, 4205, 4306)
Provides a basis for synthesis of current leadership and management theories within the professional practice of nursing. Examine the interaction among professional nursing issues, health care trends, and the leadership potential of nurses.

Nurs 4406W. Leadership and Management for Shaping Professional Nursing Practice. (4 cr; A-F only. Prereq–4103, 4205, 4306)
Provides a basis for synthesis of current leadership and management theories within the professional practice of nursing. Examine the interaction among professional nursing issues, health care trends, and the leadership potential of nurses.

Nurs 4407H. Honors: Seeking Solutions to Global Health Issues. (2 cr. Prereq–[4404H, nursing honors student] or #)
Global health issues from interdisciplinary perspective. Emphasizes ethical/cultural sensitivity, complexities of issues, in order to propose realistic actions for resolution.

Nurs 4410. Critical Care Nursing. (3 cr. Prereq–4200, 4210, 4300, 4302, 4306, 4310, ¶4400, ¶4401, ¶4402, ¶4404, ¶4406)
Acquire fundamental knowledge underlying the care of patients with life-threatening conditions and their families in a highly technological and unpredictable environment. Analyze relationships of multi-system alterations in functioning from complex physiological disruptions using advanced critical thinking and prioritization skills.

Nurs 4420. Managing Care of Adult Clients With Complex Health Conditions Across the Continuum. (3 cr. Prereq–4100, 4101, 4102, 4103, 4104, 4200, 4202, 4205, 4210, 4300, 4302)
Coordination of comprehensive nursing care to clients with multi-system illnesses and complex socio-emotional situations, across settings and over time. Specialized strategies such as discharge planning, care paths, end-of-life interventions, and interdisciplinary collaboration. Emphasizes achieving quality health outcomes for clients and their families.

Nurs 4501. Critical Care Nursing Practice. (3 cr. Prereq–4400, 4401, 4402, [4404 or 4404H], 4406W, 4410)
Students participate in care of critically-ill patients with a nurse preceptor. Synthesize theoretical knowledge and practice skills. Increase competence in evaluating patient data from numerous sources. Provide safe, organized care to patients with life-threatening, multi-system problems.

Nurs 4511. Practicum in Managing the Care of Adult Clients With Complex Health Conditions Across the Continuum. (3 cr. Prereq–4100, 4101, 4103, 4104, 4200, 4202, [4205V or 4205W], 4210, 4300, 4302, 4420)
Students participate in coordinating comprehensive nursing care to clients and their families with complex/chronic health problems across settings and over time with a nurse preceptor. Coordinating/implementing care for a group of clients. Functioning as an interdisciplinary team leader/member.

Nurs 4800. Nursing Topics. (1-16 cr [max 16 cr]. Prereq–#)
Exploration of a topic to meet individual student needs.

Nurs 4801. Research Topics. (1-16 cr [max 16 cr]. Prereq–#)
Exploration of research topic to meet individual student needs.

Nurs 5141. Ethical Issues in Health Care of Elders. (3 cr. Prereq–Grad student or nursing sr or #)
Health care related ethical issues that confront elders, their families, health care providers, and society.

Nurs 5170. Research Topics. (1-16 cr [max 16 cr]. Prereq–#)
Exploration of research topic to meet individual student needs.

Nurs 5171. SPSS Programming and Data Analysis. (2 cr. Prereq–Inferential statistics, [[grad or professional] student] or #])
Skills needed to collect/analyze data using SPSS for Windows. Review of statistical methods.

Nurs 5172. Decision Making in Health Care. (2 cr. Prereq–Grad student, #)
Selected classical conceptual models of decision making, their particular perspectives/limitations/usefulness for decision making about health care issues. Models/components used to assess, evaluate, teach, or help healthy people, patients, families, health care professionals, or policy making groups in making health care decisions.

Nurs 5200. Holistic Health Assessment and Therapeutics for Advanced Practice Nurses. (3 cr. Prereq–#)
Health assessment knowledge/skills for advanced nursing practice with patients across age span, including pregnancy. Selected nursing interventions, complementary therapies examined for application to specific populations/illnesses.

Nurs 5202. Introduction to Complementary Healing Practices. (3 cr)
Historical and cultural context of the allopathic and complementary healing traditions. Philosophies and paradigms of selected complementary therapies and culturally based healing traditions; descriptions of selected interventions.

Nurs 5204. Population Focused Assessment and Intervention. (2 cr. Prereq–Grad nursing major)
Population focused assessment in health planning. Models of assessment for communities, organizations, other aggregates. Skill development in conducting/analyzing/using assessment in planning population focused interventions.

Nurs 5222. Advanced Physiology. (3 cr. Prereq–Grad nursing major or #)
Systems approach to human physiology/pathophysiology. Physiologic changes across life span. Emphasizes clinical application using population-specific content related to various specialty areas in advanced practice nursing.

Nurs 5223. Assessment of Psychopathology for Advanced Practice Psychiatric/Mental Health Nursing. (4 cr. Prereq–Nurs grad or #)
Advanced concepts from nursing theory and research, social sciences, neuropsychology, and neurophysiology used in the assessment of psychiatric symptoms and disorders across the age continuum. During clinical, develop proficiency in the assessment of psychopathology in clients with psychiatric symptoms.

Nurs 5224. Clinical Pharmacotherapeutics. (3 cr. Prereq–Grad, #)
Advanced practice nurses in primary care get a foundation in pharmacotherapeutics across the life span. Topics include pharmacodynamics/kinetics/epidemiology, client patterns of medication use, selection of appropriate drugs for selected client conditions, and prescriptive writing privileges for advanced practice nurses.

Nurs 5225. Psychopharmacology for Advanced Practice Psychiatric/Mental Health Nursing. (3 cr. Prereq–Grad student or RN [with master's degree] or #)
Advanced concepts in neuroscience, psychopharmacology, and clinical management related to psychopharmacologic treatment of psychiatric disorders/symptoms. Application to problems in various clinical settings.

Nurs 5300. Health Behavior Intervention: Theory and Application. (3 cr. Prereq–Grad or #)
Interdisciplinary course examines theoretical foundations and research base of intervention strategies to promote health behavior acquisition, behavioral change, and maintenance for adults (individuals and groups). Critical examination of health behavior and patterns and health risk assessment; approaches to program creation.

Nurs 5340. Group as a Health-Care Intervention. (2 cr. Prereq–Grad or #)
Theoretical concepts and research findings from the areas of group therapy and dynamics are applied in the development of a model for using group as an intervention for various client populations.

Nurs 5501. Professional Issues in Nurse-Midwifery. (1-2 cr. Prereq–Nurs grad major, #)
Analysis of professional issues that confront and impact the practice of certified nurse-midwives. History and development of the professional organization including certification, legislation, ethical dimensions, public policy, and clinical practice issues.

Nurs 5520. Women's Issues: A Health Perspective. (3 cr. Prereq–Upper div or grad student)
Multidisciplinary exploration and analysis of a broad range of women's health issues: physiological, developmental, historical, sociocultural, feminist, nursing and medical. Topics include health promotion and reproductive health issues across the life span.

Nurs 5601. School Nursing in the Educational System and the Community. (1-3 cr; A-F only. Prereq–3 yrs of college level courses)
School health problems, assessment/intervention strategies. Integration of research findings. Applications with individuals, families, communities.

Nurs 5604. Advanced Health Assessment and Interventions With Adolescents. (2 cr. Prereq–CPsy 5303 or equiv or #)
Integrates knowledge from nursing, public health, health behavior, and adolescent development as framework for developing health assessment/intervention strategies for clinical practice with adolescents.

Nurs 5800. Nursing Topics. (1-4 cr [max 8 cr]. Prereq–#)
Course allows students to study a topic not included in regular courses, or for faculty to offer a course to determine interest in a topic.

Nurs 5801. Policymaking, Health Policy, Political Action and Nursing. (3 cr)
Analysis of sociocultural values, public policymaking, health care policy, and the relationship to the health care delivery system. The impact of health care policy on the profession and practice of nurses, and on consumers. Enhanced participation of nurses in policymaking and political action.

Nurs 5802. Spirituality and Nursing Practice. (2 cr. Prereq–For undergrad cr: nurs sr or RN; for grad cr: nurs grad student or #)
Exploration of the concept of spirituality as integral to the whole person. Discussion of spiritual nursing care interventions.

For definitions of course numbers, symbols, and abbreviations, see page 296.

Nurs 5803. Transcultural Nursing: Theories and Issues. (2 cr. Prereq–Cultural anth course or #)
Study of cultural factors that influence theories, issues, and nursing care practices in diverse cultures and subcultures. Emphasis on nursing within international systems of health care and nursing practices related to various health-illness systems in this country and worldwide.

Nurs 5804. Therapeutic Healing Touch: Research and Practice. (2 cr; S-N only. Prereq–[Upper div or grad] student in [health sciences or health care])
Therapeutic/Healing Touch as energetic based, biofield healing modality. Art/science of this modality. Research literature related to Therapeutic Touch/Healing Touch. Explanations for effects. Practice of Therapeutic Touch, intervention techniques.

Nurs 5805. The 'M' technique. (1 cr; S-N only. Prereq–Undergrad nursing student or grad student in health sciences or health professional)
Scientific/theoretical foundations/practice of 'm' technique, a touch therapy for promoting relaxation by topically administering essential oils. Appropriate applications. Demonstration/practice of technique. Interdisciplinary course.

Nurs 5808. American Indian Health and Health Care. (2 cr. Prereq–Upper div or grad student or #)
Examines health of native nations in Minnesota within historical/cultural contexts. Epidemiology of major health conditions, health services, traditional Indian medicine, health beliefs. Opportunities for contact with Native American community.

Nurs 5809. Seminars in Critical Care. (2 cr)
Analyzes current research/developments in treatments, care delivery, and ethical issues affecting critically ill patients and their families. Students participate with team of multidisciplinary faculty from Center for Critical Care in critiquing/presenting literature and discussing applications to clinical practice.

Nurs 5830. Advanced Clinical Nursing. (1-6 cr. Prereq–Graduate nursing major or #)
Independent study or faculty seminar on special clinical topic.

Operations and Management Science (OMS)

Department of Operations and Management Science

Curtis L. Carlson School of Management

OMS 1550. Business Statistics: Data Sources, Presentation, and Analysis. (4 cr; A-F only. Prereq–[Math 1031 or equiv], at least 20 cr)
Exploratory data analysis, basic inferential procedures, statistical sampling/design, regression/time series analysis. How statistical thinking contributes to improved decision making.

OMS 3001. Introduction to Operations Management. (3 cr; A-F only. Prereq–50 cr)
Concepts, principles, and techniques for managing manufacturing/service operations. Emphasizes decision making in operations function of organizations. Quantitative/qualitative methods for improving management of operations.

OMS 3041. Project Management. (2 cr; A-F only. Prereq–3000 or #)
Principles and methods useful for planning and controlling a project, including development of project plan, resource planning and scheduling, and project monitoring and control. Selected computerized packages are studied, including PERT and CPM, and examples of different types of projects from manufacturing and service industries are used.

OMS 3056. Managing Supply Chain Operations. (4 cr; A-F only. Prereq–3001 or #)
Decisions/tradeoffs managers face when directing operations of supply chain. Forecasting, capacity/production planning, just-in-time, theory of constraints, managing supply chain flows, enterprise resource planning (ERP), supply chain design.

OMS 3059. Quality Management and Six Sigma. (4 cr; A-F only. Prereq–3001 or equiv or #)
Critical concepts of process management from Quality Management and Six Sigma perspective. Managerial/technical aspects of improvement. Strategy, improvement tools/methods, Malcolm Baldrige Award, ISO 9000, Six Sigma.

OMS 5170. Simulation Modeling and Analysis. (4 cr; A-F only. Prereq–MBA 6120 or BA 1550 or #)
Techniques and application of computer simulation modeling and analysis. Includes animations of existing or proposed real-world facilities and processes. Experiments in simulation programming language and environment. Simulation models and animations demonstrating actual operation of models. Planning, analysis, and interpretation of simulation experiment results.

Otolaryngology (Otol)

Department of Otolaryngology

Medical School

Otol 5101. Introduction to the Basic Sciences in Otolaryngology I: Ear. (2 cr. Prereq–Otolaryngology major or #)
Multidisciplinary introduction to the basic sciences of the ear. Acoustics and psychoacoustics, temporal bone anatomy, external and middle ear mechanisms, cochlear physiology, auditory neurophysiology, ear embryology, ear biochemistry, immunology, fine structures, vestibular mechanisms and measurement. S-N grading option for nonmajors only.

Otol 5102. Introduction to the Basic Sciences in Otolaryngology II: Head and Neck. (2 cr. Prereq–Otol major or #)
Multidisciplinary introduction to the basic sciences of the head and neck. Laryngeal anatomy and physiology, nasal anatomy and physiology, immune biology, embryology of head and neck. S-N grading option for nonmajors only.

Otol 5993. Directed Studies. (1-12 cr [max 12 cr]. Prereq–#)
Directed readings and preparation of reports on selected topics.

Pharmacology (Phcl)

Department of Pharmacology

Medical School

Phcl 1450. Introduction to Pharmacology: Concepts of Drug Action. (1 cr; A-F only. Prereq–Upper div or #; courses in [biology, biochemistry] recommended)
Selected topics on concepts of how drugs act, their discovery, implications for society. Lectures, discussion, visits to pharmacology research labs.

Phcl 3001. Dental Therapeutics. (2 cr; A-F only. Prereq–Regis dental hygiene program or #)
Pharmacology for the dental hygienist. Principles of drug actions.

Phcl 5100. Pharmacology for Pre-Nursing Students. (3 cr; A-F only. Prereq–[Biochemistry, human physiology] or #)
Drug principles, mechanisms of action.

Phcl 5101. Pharmacology for Pharmacy Students. (3 cr; A-F only. Prereq–Regis 2nd yr pharmacy student or #)
Action/fate of drugs. Lectures, lab.

Phcl 5102. Pharmacology for Pharmacy Students. (2 cr; A-F only. Prereq–5101 or #)
Action/fate of drugs.

Phcl 5103. Pharmacology for Dental Students. (3 cr. Prereq–Regis dental student or #)
Pharmacological principles/actions of drugs.

Phcl 5109. Problems in Pharmacology. (1-18 cr. Prereq–Upper div or grad student or #)
Research projects and special problems by arrangement.

Phcl 5110. Introduction to Pharmacology. (2 cr [max 2 cr]; A-F only. Prereq–Grad student or #)
Basic principles of Pharmacology. Focuses on molecular mechanisms of drug action.

Phcl 5111. Pharmacogenomics. (3 cr; A-F only. Prereq–Grad student or #)
Human genetic variation, its implications. Functional genomics, pharmacogenomics, toxicogenomics, proteomics. Interactive, discussion-based course.

Phcl 5210. Pharmacology. (1 cr; A-F only. Prereq–Grad student or #)
Principles of pharmacology. Meets with 6110.

Phcl 5211. Pharmacology. (2 cr; A-F only. Prereq–5210 or #)
Continuation of 5210. Meets with 6111. Lectures on the major classes of drugs.

Phcl 5212. Pharmacology. (3 cr; A-F only. Prereq–5211 or #)
Continuation of 5211. Meets with 6112

Phcl 5462. Neuropsychopharmacology of Abused Drugs. (3 cr. §NSc 5208. Prereq–6112, Psy 5062 or #)
Principles of pharmacology and methodologies used to study relationships between drugs and biochemical, behavioral, and neurophysiological variables. Functional biogenic amine, peptidergic and other pathways; theories of tolerance of and/or dependence on stimulants, hallucinogens, depressants, and opiates.

Pharmacy (Phar)

Department of Pharmacy Practice

College of Pharmacy

Phar 1001. Orientation to Pharmacy. (1 cr; S-N only)
Pharmacy career opportunities, pharmacist's role, issues faced by pharmacy profession, information about College of Pharmacy.

Phar 1002. Health Sciences Terminology. (2 cr. Prereq–Orientation [online or in-person], obtain info by end of 1st day of class at [B-288 Mayo or www.pharmacy.umn.edu/outreach/medterm/1002] Questions may be addressed to Ruthie Knoche Granheim (medterm@umn.edu; 612-624-7976).)
Students analyze/build words from combining forms, suffixes, and prefixes in a systematic manner. Medical language that serves as basis for coursework in health sciences. Self-study course.

Phar 5201. Health Sciences Applied Terminology. (2 cr. Prereq–[1002 or anatomy/physiology], orientation [online or in-person], obtain info by end of 1st day of class at [B-288 Mayo or www.pharmacy.umn.edu/outreach/medterm/5201] Questions may be addressed to (medterm@umn.edu; 612-624-7976).)
Medical terms, how to apply them when documenting/reporting patient care procedures. Medical language that serve as basis for coursework in health sciences. Self-study course.

Phar 5270. Therapeutics of Herbal and Other Natural Medicinals. (2 cr; A-F only. Prereq–Phsl 6051, organic chemistry, pathophysiology of disease states, third yr pharmacy student)
Herbal products/supplements. Pharmacology, clinical indications, and drug interactions of most commonly used products in nontraditional complementary health care. Historical significance and evidenced-based role of these products in health care. Case studies of clinical applications.

Phar 5280. Principles of Health Care Counseling. (1 cr. Prereq–Health professional student in Academic Health Center)
Basic counseling theory/practice. Means of bringing about behavioral change from perspective of pharmacy/health care practitioner. Application of course principles through interactive small group exercises. Case presentations by experienced pharmaceutical care practitioners.

Philosophy (Phil)

Department of Philosophy

College of Liberal Arts

Phil 1001. Introduction to Logic. (4 cr. §1021)
Application of formal techniques for evaluating arguments.

Phil 1001H. Honors Course: Introduction to Logic. (4 cr. §1021)
Application of formal techniques for evaluating arguments.

Phil 1002V. Honors: Introduction to Philosophy. (4 cr. §1006W, §1026W, §1102)
Problems. Methods. Schools of philosophy (historical, contemporary).

Phil 1002W. Introduction to Philosophy. (4 cr. §1006W, §1026W, §1102)
Problems, methods, historical/contemporary schools of philosophy.

Phil 1003V. Honors: Introduction to Ethics. (4 cr. §1103W)
Central concepts, principal theories of moral philosophy.

Phil 1003W. Introduction to Ethics. (4 cr. §1103)
Central concepts/principal theories of moral philosophy.

Phil 1004V. Honors: Introduction to Political Philosophy. (4 cr)
Central concepts, principal theories of political philosophy.

Phil 1004W. Introduction to Political Philosophy. (4 cr)
Central concepts and principal theories of political philosophy.

Phil 1005. Scientific Reasoning. (4 cr. Prereq–[1st or 2nd] yr student or #)
Techniques for understanding/evaluating scientific information as presented in popular media and in specialized publications. Emphasizes general reasoning skills that do not require extensive training in particular sciences.

Phil 1006W. Philosophy and Cultural Diversity. (4 cr. §1002W, §1026W, §1102)
Central problems/methods of philosophy through culturally diverse texts. Focus is critical/comparative, reflecting range of U.S. philosophical traditions.

Phil 1007. Introduction to Political Philosophy Practicum. (1 cr. Prereq–¶1004W)
Students do at least two hours a week of community service and connect their service activities in writing to issues discussed in 1004.

Phil 1008W. Environmental Ethics. (4 cr)
Philosophical basis for membership in moral community. Theories applied to specific problems (e.g., vegetarianism, wilderness preservation). Students defend their own reasoned views about moral relations between humans, animals, and nature.

Phil 1021. Accelerated Introduction to Logic. (3 cr. §1001)
Application of formal techniques for evaluating arguments.

Phil 1026W. Philosophy and Cultural Diversity. (3 cr. §1002W, §1006W, §1102)
Central problems/methods of philosophy through culturally diverse texts. Focus is critical/comparative, reflecting a range of U.S. philosophical traditions.

Phil 1102. Introduction to Philosophy. (4 cr. §1002W, §1006W, §1026W)
Problems, methods, historical/contemporary schools of philosophy.

Phil 1103. Introduction to Ethics. (4 cr. §1003W)
Central concepts, principal theories of moral philosophy.

Phil 1910W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule*.

Phil 3001V. Honors: General History of Western Philosophy: Ancient Period. (4 cr)
Major developments in ancient Greek philosophic thought: pre-Socratics, Socrates, Plato, Aristotle, Hellenistic thinkers.

Phil 3001W. General History of Western Philosophy: Ancient Period. (4 cr)
Major developments in ancient Greek philosophic thought: pre-Socrates, Socrates, Plato, Aristotle, Hellenistic thinkers.

Phil 3005V. Honors: General History of Western Philosophy: Modern Period. (4 cr. §3005W. Prereq–Honors)
Major developments in philosophic thought of modern period: renaissance beginnings, Descartes through Kant.

Phil 3005W. General History of Western Philosophy: Modern Period. (4 cr. §3005V)
Major developments in philosophic thought of the modern period: renaissance beginnings, Descartes through Kant.

Phil 3010W. Classical Ancient Text. (3 cr)
Introduction to and in-depth analysis of Plato's Republic.

Phil 3101. General History of Western Philosophy: Ancient Period. (4 cr)
Major developments in ancient Greek philosophic thought: pre-Socrates, Socrates, Plato, Aristotle, Hellenistic thinkers.

Phil 3105. General History of Western Philosophy: Modern Period. (4 cr. Prereq–§3005W or 3005V)
Major developments in philosophic thought of modern period: renaissance beginnings, Descartes through Kant.

Phil 3231W. Philosophy and Language. (4 cr)
Philosophical issues concerning the nature and use of human language.

Phil 3234W. Knowledge and Society. (4 cr)
Critical discussion of concepts such as knowledge, objectivity, justification, rationality, evidence, authority, expertise, and trust in relation to the norms and privileges of gender, race, class, and other social categories.

Phil 3302W. Moral Problems of Contemporary Society. (4 cr. §3322W, §3402)
Selected moral problems of private/public life.

Phil 3303W. Business Ethics. (4 cr; A-F only)
Purpose of business, its obligations to various stakeholders (e.g. stockholders, customers, employees), its social function.

Phil 3304W. Law and Morality. (4 cr)
A study of the relationship among law, morality, and our role as citizens.

Phil 3305. Medical Ethics. (4 cr)
Moral problems confronting physicians, patients, and others concerned with medical treatment, research, and public health policy. Topics include abortion, living wills, euthanasia, genetic engineering, informed consent, proxy decision-making, and allocation of medical resources.

Phil 3307W. Social Justice and Community Service. (4 cr)
Exploration of concepts of justice, charity, equality, freedom, community service in connection with current social issues. Perspectives from philosophy, history, literature, and student involvement in the community. Community service for at least three hours per week.

Phil 3308W. Social Justice and Community Service. (4 cr)
Special exploration of diversity in connection with concepts of justice, charity, equality, freedom, community service. Perspectives from philosophy, history, literature, and student involvement in the community. Community service for at least three hours per week. Students may enroll in this course without having taken 3307.

Phil 3311W. Introduction to Ethical Theory. (4 cr)
Nature and justification of moral judgments and moral principles; analysis of representative moral views.

Phil 3322W. Moral Problems of Contemporary Society. (3 cr. §3302W, §3402)
Selected moral problems of private/public life.

Phil 3402. Moral Problems of Contemporary Society. (4 cr. §3302W, §3322W)
Selected moral problems of private/public life.

Phil 3502W. Introduction to Aesthetics. (3 cr)
Development of aesthetic theories with applications to specific aesthetic problems.

Phil 3601W. Scientific Thought. (4 cr. Prereq–One course in philosophy or natural science)
Introduction to philosophical issues concerning the nature of scientific knowledge. Reading of historical and contemporary sources that describe major scientific achievements and controversies.

Phil 3602. Science, Technology, and Society. (3 cr; A-F only)
Philosophical issues that arise out of interaction between science, technology, society (e.g., religion and science, genetics and society, science and the environment).

Phil 3602W. Science, Technology, and Society. (3 cr; A-F only)
Philosophical issues that arise out of interaction between science, technology, society (e.g., religion and science, genetics and society, science and the environment).

Phil 3607W. Philosophy of Psychology. (4 cr. Prereq–One course in philosophy or psychology)
Major theories of mind including the "invention" of the mind by Descartes, classical empiricism, the impact of Darwinism, Freud's theories, Gestalt psychology, behaviorism, Chomsky's rationalism, contemporary functionalism, the computer model.

Phil 3900H. Honors Seminar. (3 cr. Prereq–Honors regis, 6 cr of 3xxx-5xxx philosophy courses)
Topics of contemporary interest varying from semester to semester.

Phil 3910W. Major Seminar. (3 cr. Prereq–Phil major or #)
Development and presentation of the major project.

Phil 3993. Directed Studies. (1-3 cr [max 6 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Phil 4003. Medieval Philosophy. (3 cr. Prereq–[Grad or upper div undergrad] student)
Survey of several major figures of the medieval Christian synthesis (e.g., Augustine, Anselm, Aquinas, Scotus, Ockham).

Phil 4004W. 19th-Century Philosophy. (3 cr. §4104; [Grad or upper div undergrad] student)
Survey of several major figures from 19th century (e.g., Hegel, Schopenhauer, Mill, Kierkegaard, Marx, Nietzsche).

Phil 4008W. Survey of Contemporary Philosophy. (3 cr. Prereq–3005 or #)
Survey of major figures in contemporary analytic/phenomenological philosophy (e.g., Dewey, Russell, Wittgenstein, Heidegger, Carnap, de Beauvoir).

Phil 4009W. Existentialism. (3 cr. §4109. Prereq–3005 or 4004 or #)
Central themes (e.g., being-in-the-world, freedom, engagement) of several important existentialist thinkers (e.g., Kierkegaard, Jaspers, Sartre, de Beauvoir, Baldwin).

Phil 4010W. Selected Ancient Philosopher. (3 cr. Prereq–3001 or #)
One or more major writings of selected ancient philosopher (e.g., Plato's *Parmenides*, Plato's *Sophist*, Aristotle's *Metaphysics*).

Phil 4030. Selected Medieval Philosopher. (3 cr. Prereq–3001 or 4003 or #)
Major work of selected medieval philosopher (e.g., Anselm's *Proslogion*, Aquinas's *Summa contra Gentiles, Books I/II*, Nicholas of Cusa's *On Learned Ignorance*).

Phil 4040W. Selected Rationalist. (3 cr. Prereq–3005 or #)
One or more major writings of selected rationalist (e.g., Descartes' *Principles of Philosophy*, Spinoza's *Ethics*, Conway's *Principles of the Most Ancient and Modern Philosophy*, Leibniz's *Discourse on Metaphysics*).

Phil 4050W. Selected Empiricist. (3 cr. Prereq–3005 or #)
One or more major writings of selected empiricist (e.g., Locke's *Essay Concerning Human Understanding*, Berkeley's *Principles of Human Knowledge*, Hume's *Treatise of Human Nature*).

Phil 4055W. Kant. (3 cr. Prereq–3005 or 4004 or #)
Major work (e.g., *Critique of Pure Reason*).

Phil 4070W. Selected 19th- or Early to Middle 20th-Century Philosophy. (3 cr [max 9 cr]. Prereq–One sem history of philosophy)
Major writings of selected 19th- or early to middle 20th-century philosopher (e.g., Schopenhauer's *World as Will and Idea*, Thoreau's *Walden*, Du Bois's *The Souls of Black Folk*, Wittgenstein's *Philosophical Investigations*, de Beauvoir's *The Second Sex*).

Phil 4085W. Wittgenstein. (3 cr. Prereq–3005 or 4231 or #)
Major work (e.g., *Philosophical Investigations*).

Phil 4101W. Metaphysics. (3 cr. Prereq–One sem history of philosophy or #)
Philosophical theories concerning nature of reality.

Phil 4104. Nineteenth Century Philosophy. (3 cr. §4004W. Prereq–[grad or upper div undergrad] student)
Survey of several major figures from 19th century (e.g., Hegel, Schopenhauer, Mill, Kierkegaard, Marx, Nietzsche).

Phil 4105W. Epistemology. (3 cr; A-F only. Prereq–1001 or #)
Theories of nature/sources of knowledge/evidence.

Phil 4109. Existentialism. (3 cr. §4009W. Prereq–3005 or 4004 or #)
Central themes (e.g., being-in-the-world, freedom, engagement) of several important existentialist thinkers (e.g., Kierkegaard, Jaspers, Sartre, de Beauvoir, Baldwin).

Phil 4231W. Philosophy of Language. (3 cr. Prereq–[1001, 5201] or #)
Theories of reference, linguistic truth, relation of language/thought, translation/synonymy.

Phil 4310W. History of Moral Theories. (3 cr. Prereq–1003 or #)
Issues in western moral philosophy from classical age to present.

Phil 4320W. Intensive Study of a Historical Moral Theory. (3 cr. Prereq–1003 or #)
Intensive consideration of an author or theory in the history of moral or political philosophy.

Phil 4321W. Theories of Justice. (3 cr. Prereq–1003 or 1004 or #)
Philosophical accounts of concept/principles of justice.

Phil 4324W. Ethics and Education. (3 cr. Prereq–6 cr in [philosophy or education] or #)
What constitutes good education, both in terms of educational outcomes and of processes that promote learning? What connections are there between concepts of good education and of good society?

Phil 4325W. Education and Social Change. (4 cr; A-F only)
Connections between education, social change. Theories of democratic/popular education, their application through in-depth practicum in community education setting.

Phil 4326W. Lives Worth Living: Questions of Self, Vocation, and Community. (4 cr)
Immersion experience. Students live together as a residential community of learners. Works of philosophy, history, and literature form backdrop for exploring such questions as How is identity constructed? What is vocation? What experiences of community are desirable in a life? Each student creates a life-hypothesis for a life worth living.

Phil 4330W. Contemporary Moral Theories. (3 cr. Prereq–1003 or #)
Discusses view that evaluative judgments cannot be based on factual considerations alone, relation of this view to objectivity of ethics.

Phil 4414W. Political Philosophy. (3 cr. Prereq–1004 or #)
Survey of historical/contemporary works in political philosophy.

Phil 4501W. Principles of Aesthetics. (3 cr. Prereq–3502 or one philosophy course or #)
Problems arising in attempts to identify, characterize, or evaluate art.

Phil 4510W. Philosophy of the Individual Arts. (3 cr. Prereq–3502)
Aesthetic problems that arise in studying or practicing an art.

Phil 4521. Philosophy of Religion. (3 cr. Prereq–8 cr in philosophy)
Conceptual problems that arise from attempts to provide rational justification for religious belief.

Phil 4605. Space and Time. (3 cr. Prereq–Courses in [philosophy or physics] or #)
Philosophical problems concerning nature/structure of space, time, and space-time.

Phil 4607W. Philosophy of the Biological Sciences. (3 cr. Prereq–Courses in [philosophy or biology] or #)
Structure/status of evolutionary theory. Nature of molecular biology, genetics. Reductionism in biology. Legitimacy of teleology. Species concept.

Phil 4611W. Philosophy of the Social Sciences. (3 cr. Prereq–9 cr of [philosophy or social science] or #)
Criteria for describing/explaining human actions. Problems of objectivity, reduction, freedom.

Phil 4614W. Philosophy of Psychology. (3 cr. Prereq–[[3607 or Psy 3051], 5011] or #)
Problems/prospects in recent developments in psychology, cognitive science, and philosophy of mind.

Phil 4615W. Minds, Bodies, and Machines. (3 cr. Prereq–One course in philosophy or #)
Mind-body problem. Philosophical relevance of cybernetics, artificial intelligence, computer simulation.

Phil 4622W. Philosophy and Feminist Theory. (3 cr. Prereq–8 cr in [philosophy or women's studies] or #)
Encounters between philosophy/feminism. Gender's influence in traditional philosophical problems/methods. Social role of theorist/theorizing as they relate to politics of feminism.

Phil 4760. Selected Topics in Philosophy. (3 cr [max 9 cr]. Prereq–3xxx-5xxx course in phil or #)
Philosophical problems of contemporary interest. Topics specified in *Class Schedule*.

Phil 4993. Directed Studies. (1-3 cr [max 6 cr]. Prereq–#,Δ,❑)
Guided individual reading or study.

Phil 5201. Symbolic Logic I. (4 cr. Prereq–1001 or #)
Study of syntax and semantics of sentential and first-order logic. Symbolization of natural-language sentences and arguments. Development of deductive systems for first-order logic. Metatheoretic proofs and methods, including proof by mathematical induction and proof of consistency and completeness.

Phil 5202. Symbolic Logic II. (4 cr. Prereq–5201 or #)
Elements of set theory, including the concepts of enumerability and nonenumerability. Turing machines and recursive functions; the results of Church, Godel, and Tarski and the philosophical significance of those results.

Phil 5211. Modal Logic. (3 cr. Prereq–5201 or #)
Axiomatic and semantic treatment of propositional and predicate modal logics; problems of interpreting modal languages.

Phil 5221. Philosophy of Logic. (3 cr. Prereq–5202 or #)
Attempts to answer, "What is logic?" Scope of logic. Disputes about alternative logics. Theories concerning logical truth (e.g., conventionalism: view that logical truths are contingent).

Phil 5222. Philosophy of Mathematics. (3 cr. Prereq–5202 or 5xxx math course)
Major philosophical questions arising in connection with mathematics: What is mathematics about? How do we know the mathematics we do? What is the relation between mathematics and the natural sciences. Selected readings of leading contributors such as Frege, Dedekind, Russell, Hilbert, Brunner, Godel, Quine.

Phil 5325. Biomedical Ethics. (3 cr. Prereq–# for undergrads)
A survey of major topics and issues in biomedical ethics including patients' rights and duties, informed consent, confidentiality, ethical issues in medical research, the initiation and termination of medical treatment, euthanasia, abortion, and the allocation of medical resources.

Phil 5415. Philosophy of Law. (3 cr. Prereq–1003 or 1004 or 3302 or social science major or #)
Analytical accounts of law and legal obligation.

Phil 5606. Philosophy of Quantum Mechanics. (3 cr)
Problems of interpretation in ordinary (nonrelativistic) quantum mechanics. Two-slit experiment, Schrödinger cat paradox (measurement problem), Einstein-Podolsky-Rosen paradox. Leading approaches to interpretation (Copenhagen, hidden variables, universal wave function) and their connections with philosophical issues.

Phil 5760. Selected Topics in Philosophy. (3 cr [max 9 cr]. Prereq–3xxx-5xxx course in phil or #)
Philosophical problems of contemporary interest. Topics specified in *Class Schedule*.

Phil 5993. Directed Studies. (1-3 cr [max 6 cr]. Prereq–#,Δ,❑)
Guided individual reading or study.

Physical Education (PE)

School of Kinesiology

College of Education and Human Development

PE 1004. Diving: Springboard. (1 cr. Prereq–1007 or equiv or #)
Fundamentals of diving. Proper mechanics/techniques to ensure safety. Technical/numerical aspects. Lecture, participatory testing.

PE 1007. Beginning Swimming. (1 cr)
Introduction to basic aquatic safety, fundamentals of swimming and hydrodynamics. Principles of hydrodynamics and stroke mechanics; five basic strokes; basic rescue techniques with use of pool equipment; hydrotherapy for disabilities and other conditions, opportunities for competitive activities, lifetime enjoyment of aquatics.

PE 1014. Conditioning. (1 cr)
Fundamentals of personal fitness. Principles of fitness; health and motor skill components of fitness; principles of training/conditioning programs; nutrition; weight control; common fitness injuries; motivation and consistency in fitness programs; stress management.

PE 1015. Weight Training. (1 cr)
Introduction to weight training. Basic aspects of weight training including exercise selection and technique, charting workouts, program design, nutritional considerations, and safety.

PE 1016. Posture and Individual Exercise. (1 cr)
Good posture techniques, individual exercises, fitness concepts, and mental techniques. Specific overall sound body and mind techniques to include flexibility exercises, cardiovascular fitness, resistance training, nutrition management, weight control, stress management, and self-thought.

PE 1029. Handball. (1 cr)
Hand and eye coordination, footwork in practice and game conditions, and skills and strategies of service and rally for the court sport handball (four-wall version). Novice to intermediate levels of play accommodated.

PE 1031. Sabre Fencing. (1 cr)
Basic sabre techniques, movement, an overview of fencing as a recreational sport and an Olympic sport, and the history of fencing.

PE 1032. Badminton. (1 cr)
Fundamentals including etiquette, terminology, game rules for singles and doubles, footwork, shot selection, and strategy.

PE 1033. Foil Fencing. (1 cr)
Fending fundamentals, including basic foil techniques, movement, a general overview of fencing as a recreational sport and an Olympic sport, and the history of fencing.

PE 1034. Judo. (1 cr)
Basic skills for throwing, falling, grappling (matwork), choking, arm and neck techniques; contest judo from Jiu-Jitsu; fundamental rules and scoring of contests. Videotapes used for technique instruction and contest appreciation.

PE 1035. Karate. (1 cr)
Japanese Traditional Shotokan Karate (JTSK) is non-contact—no protective pads or gear are worn. Structural foundation, discipline and control, posture, basic body dynamics, blocking, kicking, punching techniques, as well as basic sparring (kumate) and forms (kata).

PE 1036. Racquetball. (1 cr)
Fundamentals of racquetball, including equipment; safety and etiquette; terminology; game rules of singles, doubles, and cutthroat; grips; basic strategies; serves and shots.

PE 1037. Squash Racquets. (1 cr)
Entry-level technique, basic equipment, international dimension courts, and fitness.

PE 1038. Beginning Tennis. (1 cr)
Fundamental strokes, including forehands, backhands, volleys, lobs, overheads, and serves; introduction to doubles play; terminology, rules, and etiquette.

PE 1041. Cycling. (1 cr)
Fundamentals of cycling, including physical fitness associated with aerobic training, stretching, safety, and bike maintenance. Students should provide bicycle in good working condition.

PE 1042. Orienteering. (1 cr)
Fundamentals, including navigation of an orienteering course using map and compass; types of orienteering courses; multiple techniques and tactics of orienteering. Course is physically challenging and requires participation in three orienteering meets (Sunday afternoons).

PE 1043. Beginning Horse Riding. (1 cr)
Techniques, styles, and communication of English riding. Students will learn riding techniques at a walk, trot, canter, and jumping.

PE 1044. Self-Defense. (1 cr)
Physical, psychological, and de-escalation skills for acting in crisis situations. Distance, body language, and tone of voice are addressed. Physical skills include striking, kicking, shifting, blocking, releasing techniques, floor defenses, and applications to armed attackers and multiple attackers.

PE 1046. Tae Kwon Do. (1 cr)
Fundamentals of Tae Kwon Do. Principles of martial arts, body mechanics of Tae Kwon Do, practical self-defense.

PE 1048. Bowling. (1 cr)
Fundamentals, including stance, approach and delivery, scoring, bowling terminology, and etiquette.

PE 1053. Ice Skating. (1 cr)
Basic turns, basic stops, balance techniques, and various other skills from both the forward and backward positions. Equipment, safety issues, ice skating terminology.

PE 1055. Golf. (1 cr)
Proper grip, stance, ball address, swing, club selection, psychological management, rules, and etiquette. Basic instruction in analyzing, assisting with, and coaching golf.

PE 1056. Nordic (Cross-Country) Skiing. (1 cr)
Introduction to the fundamental techniques of classical and freestyle cross country skiing. Students will be taught through lecture and direct experience on cross country skiing trails.

PE 1057. Beginning Skiing. (1 cr)
Introduction to alpine skiing. Students are taught to stop, turn, and use lifts, as well as safety, etiquette, and purchase of equipment. Class held at Highland Hills ski area in Bloomington.

PE 1058. Snowboarding. (1 cr. Prereq–Good general health, injury free; $75 facility fee)
Introduction to alpine snowboarding. Using American Teaching System, classes are split into nine skill levels, beginning through advanced. Held at Hyland Ski and Snowboard School in Bloomington.

PE 1059. Track and Field. (1 cr)
Introduction to track and field: conditioning and training, events and skills, strategies, track and field knowledge, equipment, facilities, and technology.

PE 1065. Tumbling and Floor Exercise. (1 cr)
Basic tumbling skills, including rolls, handstands, cartwheels, extensions, handsprings, and tucks (flips), accompanied by the appropriate spotting techniques.

PE 1067. Basketball. (1 cr)
Fundamental skills and rules of basketball, with emphasis on basic court movement and different offensive and defensive strategies.

PE 1072. Soccer. (1 cr)
Fundamentals of soccer including sporting behavior both on and off the field, game rules, soccer terminology, participation and competition drills, fundamental soccer skills, practical instruction in strategy.

PE 1073. Softball. (1 cr)
Development of basic skills for lifetime involvement.

PE 1074. Beginning Volleyball. (1 cr)
Basic skills, team play, rules, officiating, and strategy.

PE 1075. Ice Hockey. (1 cr. Prereq–1053 or equiv or #)
Offensive/defensive strategies/techniques, goal tending, scrimmage play. Students need their own equipment.

PE 1107. Intermediate Swimming. (1 cr. Prereq–#; 1007 or equiv; proficient ability to swim 100 meters)
Intermediate swimming skills. Fundamentals of swimming and hydrodynamics.

PE 1133. Intermediate Foil Fencing. (1 cr. Prereq–1033 or equiv or #)
Intermediate/advanced technical/tactical actions in foil, rudimentary epee skills, intermediate/advanced footwork. Rules, officiating, bout tactics.

PE 1135. Intermediate Karate. (1 cr. Prereq–1035 or equiv or #)
Techniques of Japanese traditional Shotokan Karate taught through Ippon Kumite (one step sparring), San Kumite (three step sparring), and Heian Shodan Kata/Nidan Kata (forms). Testing for orange belt is optional.

PE 1136. Intermediate Racquetball. (1 cr. Prereq–#; 1036 or equiv)
Improvement of basic skills and strategies. Format is determined by the number of players and their level of ability.

PE 1138. Intermediate Tennis. (1 cr. Prereq–1038 or equiv or #)
Review terminology, rules, etiquette. Improve basic skills. Singles/doubles strategy, competitive play.

PE 1154. Figure Skating. (1 cr. Prereq–1053 or equiv or #)
Terminology, rules. Basic moves, jumps, spins. On-/off-ice assignments.

PE 1157. Intermediate Skiing. (1 cr. Prereq–1057 or equiv or #; assessment is made to determine skill level)
Developing advanced skills in alpine skiing. Skiing safely on more difficult terrain. Class held at Highland Hills ski area in Bloomington.

PE 1165. Intermediate Tumbling. (1 cr. Prereq–1065 or equiv or #)
Rolls, handstands, cartwheels, extensions, handsprings, tucks (flips), twisting, and combinations. Skills accompanied by spotting techniques.

PE 1174. Intermediate Volleyball. (1 cr. Prereq–#; 1074 or equiv)
Development of a broader understanding of volleyball systems of play, and incorporation of offensive and defensive formations into team play. Fundamental skills will be developed further and more advanced skills will be introduced. Team play, transition, coaching, and officiating.

PE 1205. Scuba and Skin Diving. (1 cr. Prereq–1107 or equiv or #)
Diving equipment, physics, physiology, decompression, emergencies, recreational dive planning, oceans, currents and aquatic life, snorkeling/SCUBA equipment usage, buoyancy control, entries, emergencies.

PE 1305. Scuba Stress Rescue and Accident Management. (1 cr; A-F only. Prereq–[Open Water SCUBA Certification or higher], [CPR, First Aid] certified, [own SCUBA equipment [mask, fins, snorkel, buoyancy compensator, regulator depth pressure gauge, wet suit] or pay $55 rental fee])
Continuing education after basic SCUBA certification course. Accident prevention, personal safety, SCUBA rescue, recognizing/reducing diver stress. SCUBA Schools International (SSI) Stress and Rescue certification.

PE 1306. Lifeguard Training. (1 cr. Prereq–[Proficiently swim 500 meters, at least 17 yrs old] or #)
Upon completion, certifications are obtained in the following categories: American Red Cross Lifeguarding Today and First Aid; CPR for the Professional Rescuer; and Waterfront Lifeguarding.

PE 1411. Water Safety Instructor. (2 cr. Prereq–[Proficiency in basic strokes, completion of skill/written pre tests] or #)
Advanced lifesaving techniques, treading strategies.

PE 1415. Advanced Olympic Lifting and Conditioning. (1 cr. Prereq–[1014, [1015 or equiv]] or #)
Develops cardiovascular excellence in lifters. Olympic/traditional lifts. Emphasizes program design, nutrition, and improving speed.

PE 1720. Special Activities in Physical Education. (1-3 cr [max 9 cr])
Activities or related opportunities not normally available through regular course offerings.

For definitions of course numbers, symbols, and abbreviations, see page 296.

Physical Medicine and Rehabilitation (PMed)

Department of Physical Medicine and Rehabilitation

Medical School

PMed 1002. Orientation to Physical Therapy. (1 cr; S-N only)
Introduction to the profession of physical therapy through lectures, discussions, patient presentations, clinic visit, videotapes, and exposure to treatment equipment.

PMed 1003. Orientation to Occupational Therapy. (1 cr; S-N only)
Survey of the profession through lectures, films, demonstrations, and tours. For students investigating the field of occupational therapy.

PMed 1005. Orientation to the Health Sciences. (1 cr [max 2 cr]; S-N only)
Health sciences majors/professions. Students assess their own interests, values, and abilities as they integrate/process information to move toward a decision regarding major/career.

PMed 5058. Anatomy for Physical Therapy. (5 cr; A-F only)
Study of gross human anatomy, and surface anatomy, for practice of physical therapy. Cadaver dissection of extremities, head, neck, back, abdomen, thoracic, and pelvic regions. Correlation to clinical conditions. Lecture, laboratory.

PMed 5100. Seminar I: Overview of Rehabilitation Science. (1 cr; A-F only. Prereq–#)
History and future of physical rehabilitation, health-care models, epidemiology of physical disorders, research on treatment outcomes, measurement issues, clinical evaluation of traditional vs. nontraditional rehabilitation strategies.

PMed 5121. Issues in Mental Health. (1 cr; S-N only. Prereq–One course gen psych, one course abnorm psych)
Psychiatric/neuropsychological assessment/treatment. Issues related to medical/community management and to roles of OT/PT with respect to clients with mental health needs. Interaction between physical/mental health and disability.

PMed 5122. Descriptive Neurology. (1 cr [max 2 cr]; A-F only. Prereq–OT or PT or #)
Relates neuroanatomical/neurophysiological principles to neurological conditions commonly seen in occupational/physical therapy practice.

PMed 5135. Advanced Biomechanics I: Kinematics. (2 cr; A-F only. Prereq–#)
How to describe/measure movement. Emphasizes three-dimensional techniques. Lecture, laboratory, seminar discussion of basic and applied biomechanics, pathokinesiology, and rehabilitation literature. Classes held with 8135 registrants. Assignments vary for those registered at different levels.

PMed 5161. Theory of Physical Medicine and Rehabilitation Applied to Medical Sciences. (3 cr [max 3 cr]; A-F only. Prereq–Regis OT or PT student or #)
Clinical science lectures focusing on diagnostic procedures and medical, surgical, and rehabilitation management of patient problems in orthopedics, surgery, pediatrics, dermatology, medicine, cancer, and speech. Includes correlation to current practice and presentation of patients.

PMed 5182. Functional Neuroanatomy/Neurophysiology. (4 cr; A-F only. Prereq–Regis OT or PT student or #)
Neuroanatomic structures as functional systems and basic neurophysiologic concepts with emphasis on applications for understanding and treating physical dysfunctions.

PMed 5213. Clinical Practice of Physical Therapy. (2 cr; A-F only)
First in series of clinical education courses.

PMed 5215. Clinical Practice of Physical Therapy I. (1 cr; S-N only. Prereq–Regis PT student)
First of three-course sequence. Emphasizes sensitivity to needs of patients, families, and health-care coworkers. Patient handling techniques, communication skills, awareness of cultural differences, psychological aspect of disability, and use of community resources.

PMed 5216. Clinical Practice of Physical Therapy II. (1 cr; S-N only. Prereq–Regis PT student)
Second of three-course sequence. Emphasizes sensitivity to needs of patients, families, and health-care coworkers. Patient handling techniques, communication skills, awareness of cultural differences, psychological aspect of disability, and use of community resources.

PMed 5217. Clinical Practice of Physical Therapy III. (1 cr; S-N only. Prereq–Regis PT student)
Sensitivity to needs of patients, families, and health-care coworkers. Patient handling techniques, communication skills, awareness of cultural differences, psychological aspect of disability, use of community resources. Third of three-course sequence. Offered summer session.

PMed 5221. Therapeutic Procedures. (3 cr; A-F only. Prereq–Regis PT student)
Theory and techniques, therapeutic massage, ultraviolet radiation, medical and athletic bandaging, asepsis and isolation, thermotherapy, hydrotherapy, positive pressure devices, volumetric measurements.

PMed 5223. Electrotherapy and Electrophysiological Testing. (2 cr; A-F only. Prereq–Regis PT student)
Theory and technique of movement analysis and treatment using electrophysiological testing and therapeutic devices.

PMed 5231. Biomechanics. (3 cr; A-F only. Prereq–Regis PT student)
Forces and structures internal and external to the body responsible for both normal and abnormal human movement, including analysis techniques and independent assignments. Muscle function, palpation, posture, and gait of normal individuals with analysis to detect deviation from the norm.

PMed 5240. Human Growth and Development. (2 cr; A-F only. Prereq–Regis PT student)
Development process throughout the life span, including physical, social, cognitive, and personality development and how they may be influenced by genetic and environmental factors.

PMed 5255. Clinical Internship I. (3 cr; S-N only. Prereq–Regis PT student)
Five-week, full-time internship. Select and perform physical therapy evaluation techniques, interpret results, define rationale for physical therapy service, develop a care plan, implement treatment program, and communicate patient/client care process as a physical therapy professional.

PMed 5260. Professional Issues in Physical Therapy. (3 cr; A-F only. Prereq–Regis PT student)
Current professional issues, dilemmas, and trends in health care. Evaluation and treatment skills in physical therapy specialty areas.

PMed 5281. Therapeutic Exercise I. (3 cr; A-F only. Prereq–Regis PT student)
Principles of skeletal muscle, connective tissue, and collagen physiology, physics, and neurology as basis for therapeutic exercise. Exercise physiology and related microanatomy of the musculoskeletal and respiratory systems as they relate to rehabilitation problems. Tissue response to treatment for loss of mobility and endurance and strength training.

PMed 5282. Therapeutic Exercise II. (3 cr; A-F only. Prereq–Regis PT student)
Principles of neurophysiology, neurology, motor control, and motor learning as basis for therapeutic intervention in motor dysfunction.

PMed 5283. Musculoskeletal I. (4 cr; A-F only. Prereq–Regis PT student)
First of two-course sequence. Problem-solving approach to evaluating, treating, and preventing selected musculoskeletal conditions across the life span. Chart review, history taking, strength testing, functional testing, gait and posture examination, special orthopedic tests. Therapeutic exercises, orthopedic ambulation, joint mobilization, splinting, patient education.

PMed 5284. Musculoskeletal III. (4 cr; A-F only. Prereq–Regis PT student)
Problem-solving approach to evaluating, treating, and preventing selected musculoskeletal conditions across life span. Chart review, history taking, strength testing, functional testing, gait/posture examination, special orthopedic tests. Therapeutic exercises, orthopedic ambulation, joint mobilization, splinting, patient education. Second of two-course sequence.

PMed 5287. Neurorehabilitation I. (4 cr; A-F only. Prereq–Regis PT student)
Assessment and rehabilitation of patients with neurological conditions (e.g., cerebral vascular disease traumatic brain injury, multiple sclerosis, Parkinson's disease, amyotrophic lateral sclerosis). Using treatment procedures, orthotics, and equipment to improve function and prevent, stabilize, or decrease impairments.

PMed 5288. Neurorehabilitation II. (4 cr. Prereq–Regis PT student)
Assessment and rehabilitation of patients with neurological, immunological, and vascular conditions.

PMed 5290. Administration and Teaching Practicum. (4 cr; A-F only. Prereq–Regis PT student)
Learning experiences and special assignments related to physical therapy administration.

PMed 5293. Research Design in Physical Therapy. (3 cr; A-F only. Prereq–Regis PT student)
Predictive research, elementary statistical concepts, analysis of scientific literature, research proposal.

PMed 5294. Independent Study in Physical Therapy. (1-3 cr; A-F only. Prereq–Regis PT student)

PMed 5295. Clinical Education. (12 cr; S-N only. Prereq–Regis 3rd-yr PT student)
Students must demonstrate proficiency in communication skills, team participation, and evaluation and treatment skills; predict outcomes and manage a variety of patient diagnoses/problems consistently with good and safe judgment; and have successfully completed all previous clinical education experiences.

PMed 5300. Concepts for Occupational Therapy Practice. (4 cr; A-F only. Prereq–Regis OT student or #)
Critical thinking, ethics, professional resources/organizations, patient-therapist relationship. Level I fieldwork experience.

PMed 5313. Therapeutic Occupation. (4 cr; A-F only. Prereq–Regis OT student or #)
Occupational therapy philosophy, history, and frames of reference. Activity analysis applied to purposeful, therapeutic activities for individuals and groups.

PMed 5341. Introduction: Evaluation and Intervention I. (4 cr; A-F only. Prereq–5393 or #)
Assessment concepts/techniques. Application to patient populations with both mental health/physical disabilities. Treatment planning/documentation.

PMed 5342. Compensatory Rehabilitation: Evaluation and Intervention II. (4 cr; A-F only. Prereq–5300, 5313 or #)
Assessment of daily living performance areas; adaptation techniques to compensate for performance deficits. Level I fieldwork experience.

PMed 5343. Specialty Topics: Evaluation and Intervention III. (4 cr; A-F only. Prereq–5342 or #)
Applies critical thinking model to assessment/intervention of selected patient populations with mental/physical problems requiring specialized approaches. Focus on habilitation/rehabilitation of populations with multiple performance component deficits. Fieldwork.

PMed 5344. Neurorehabilitation: Evaluation and Intervention IV. (5 cr; A-F only. Prereq–5343 or #)
Assessment/intervention related to perception, cognition, reflexes, sensory integration, and motor control. Application to individuals with multiple performance component deficits.

PMed 5360. Dynamics of Group Models. (2 cr; A-F only. Prereq–5313 or #)
Application of group/team dynamics in diverse professional settings.

PMed 5370. Theory of Occupation. (1 cr; A-F only. Prereq–Regis OT student or #)
Occupational therapy frames of reference, role of activity, and historical development of profession.

PMed 5375. Community Resources and Health-Care Issues. (2 cr; A-F only. Prereq–[5300, 5342] or #)
Analysis of community health-care systems, including cultural/family influences on individual health and decision making. Students identify current trends in health care and determine responses to them at social, political, or legislative level.

PMed 5376. Adult Education and Planning. (1 cr; A-F only. Prereq–5313 or #)
Skills needed to plan, implement, and evaluate adult educational programs/materials for patient/family education, peer/professional education, and education of others in order to carry out therapeutic interventions. Student teaching unit, community based activity.

PMed 5380. Management of Occupational Therapy Services. (3 cr; A-F only. Prereq–[5360, 5375, 5376] or #)
Administration/management of occupational therapy services within managed care environment. Issues in Medicare, HMOs, TQM, consultation, human resources, promotion of profession. Emphasizes program development in current organizational structures.

PMed 5391. Occupation across the Life Span. (3 cr; A-F only. Prereq–[5375, 5376] or #)
The well elderly, school therapy, work-related injuries/industrial rehabilitation. Fieldwork.

PMed 5392. Research in Occupational Therapy. (3 cr; A-F only. Prereq–5313 or #)
Analysis of scientific literature, development of research proposals.

PMed 5393. Functional Anatomy and Kinesiology. (4 cr; A-F only. Prereq–Regis OT student or #)
Gross human anatomy emphasizing skeletal, muscular, circulatory, and peripheral nervous systems of the extremities and trunk. Includes cadaver lab prosections. Analyzing functional human movement from a biomechanical perspective.

PMed 5394. Orthotics. (3 cr; A-F only. Prereq–5341 or #)
Analysis, design, and construction of orthotic devices.

PMed 5395. Independent Study in Occupational Therapy. (1-4 cr [max 16 cr]. Prereq–Regis OT student or #)

PMed 5813. Cardiopulmonary Physical Therapy. (2 cr; A-F only. Prereq–Regis PT student)
Theory and techniques of cardiopulmonary evaluation and treatment. Principles of exercise response and adaptations to training.

PMed 5814. Age, Exercise, and Rehabilitation. (2 cr)

PMed 5841. Rehabilitation Science Instrumentation and Methodology. (4 cr; A-F only. Prereq–Phys 1031, Phys 1032 or equiv, #)
Theory and application of kinesiological EMG and other common instruments used to measure human motion.

Physics (Phys)

School of Physics and Astronomy
Institute of Technology

Phys 1001W. Energy and the Environment. (4 cr. Prereq–1 yr high school algebra)
Fundamental principles governing physical world in context of energy/environment. Lab.

Phys 1011. Physical World. (3 cr; A-F only. Prereq–One yr high school algebra)

Phys 1012. Elementary Physics. (4 cr; A-F only. Prereq–One yr high school algebra, Internet connectivity)
Topics represented in context of real world situations. Motion, forces, momentum, energy, heat, vibrations, sound, light, electricity, magnetism. Emphasizes development of logical reasoning skills. Lab.

Phys 1101W. Introductory College Physics I. (4 cr. Prereq–High school algebra, plane geometry, trigonometry; primarily for students interested in technical areas)
Fundamental principles of physics in the context of everyday world. Use of kinematics/dynamics principles and quantitative/qualitative problem solving techniques to understand natural phenomena. Lecture, recitation, lab.

Phys 1102W. Introductory College Physics II. (4 cr. Prereq–1101; primarily for students interested in technical areas)
Fundamental principles of physics in the context of everyday world. Use of conservation principles and quantitative/qualitative problem solving techniques to understand natural phenomena. Lecture, recitation, lab.

Phys 1111. Basic Physics I. (3 cr. Prereq–High school algebra, high school geometry, high school trigonometry)
Algebra-based. Motion of a body in one dimension. Newton's laws of motion. Emphasizes developing systematic approach to problem solving and applying it to problems. Experiments. No lab component.

Phys 1112. Basic Physics II. (3 cr. Prereq–1111 or equiv)
Algebra-based. Work, energy, momentum, collisions, circular motion, universal gravitation, heat, electricity. Systematic approach to problem solving. Experiments. No lab component.

Phys 1201W. Introductory Physics for Pre-Medicine and Biology I. (5 cr. Prereq–[High school or college] calculus, trigonometry, algebra)
Fundamental principles of physics. Description of motion, forces, conservation principles, structure of matter. Applications to mechanical systems, including fluids, waves, heat. Lab.

Phys 1202W. Introductory Physics for Pre-Medicine and Biology II. (5 cr. Prereq–1201)
Fundamental principles of physics. Motion, forces, conservation principles, structure of matter. Applications to electromagnetic phenomena, including optics, atomic structure. Lab.

Phys 1301W. Introductory Physics for Science and Engineering I. (4 cr. §Phys 1401. Prereq–¶Math 1271 or ¶Math 1371 or ¶Math 1571)
Use of fundamental principles to solve quantitative problems. Motion, forces, conservation principles, structure of matter. Applications to mechanical systems.

Phys 1302W. Introductory Physics for Science and Engineering II. (4 cr. §1402. Prereq–1301, [¶Math 1272 or ¶Math 1372 or ¶Math 1572])
Use of fundamental principles to solve quantitative problems. Motion, forces, conservation principles, fields, structure of matter. Applications to electromagnetic phenomena.

Phys 1401V. Honors Physics I. (4 cr. §1301. Prereq–Selection for IT honors or consent of IT honors office)
Comprehensive calculus-level general physics course emphasizing the use of fundamental principles to solve quantitative problems. Description of motion, forces, conservation principles, and the structure of matter with applications to mechanical systems.

Phys 1402V. Honors Physics II. (4 cr. §1302. Prereq–Selection for IT honors or consent of IT honors office)
Second semester of comprehensive calculus-level general physics course emphasizing the use of fundamental principles to solve quantitative problems. Description of motion, forces, conservation principles, fields, and the structure of matter with applications to electro-magnetic phenomena.

Phys 1901. Freshman Seminar: Environment. (1-3 cr; A-F only. Prereq–Fr with no more than 24 cr)
Topics vary. See *Class Schedule*.

Phys 1904. Freshman Seminar: International Perspective. (1-3 cr; A-F only. Prereq–Fr with no more than 24 cr or #)
Topics vary. See *Class Schedule*.

Phys 1905. Freshman Seminar. (1-3 cr; A-F only. Prereq–Fr with no more than 24 cr)
Topics vary. See *Class Schedule*.

Phys 1910W. Freshman Seminar: Writing Intensive. (1-3 cr; A-F only. Prereq–Fr with no more than 24 cr)
Topics vary. See *Class Schedule*.

Phys 2303. Physics of Matter. (4 cr. §2403, §2601. Prereq–1302, [Math 1272 or Math 1372 or Math 1572])
Use of fundamental principles to solve quantitative problems. Structure of matter. Applications to 20th-century physics such as Bohr atom and models of the hydrogen atom, classical/quantum mechanical waves, molecules, solid state, nuclear physics.

Phys 2311. Modern Physics. (4 cr. Prereq–[1302 or 1402], Chem 1022, Math 2243)
Broad overview of physical concepts developed in twentieth century. Special relativity, wave-particle duality, Schrödinger equation, Bohr atom, hydrogen atom in wave mechanics, many-electron atoms, X-rays, nuclear structure, radioactivity, nuclear reactions, statistical physics.

Phys 2403H. Honors Physics III. (4 cr. §2303. Prereq–Selection for IT honors or consent of IT honors office)
Third semester of comprehensive calculus-level general physics emphasizing the use of fundamental principles to solve quantitative problems. Applications to 20th-century physics such as classical and quantum mechanical waves, optics, special relativity, and the atomic structure of materials.

Phys 2503. Modern Physics Principles. (4 cr. §2403V. Prereq–1302W, [Math 1272 or Math 1372 or Math 1572])
Use of fundamental principles to solve quantitative problems in wave mechanics. Statistical theory from probability to thermodynamics. Applications to matter and to electromagnetic waves, optics, and special relativity.

Phys 2601. Quantum Physics. (4 cr. Prereq–[2403H or 2503 or #], [¶Math 2263 or ¶Math 2374 or ¶Math 3574])
Introduction to quantum mechanics. Applications to atomic, molecular, condensed-matter, nuclear, elementary-particle, and statistical physics. Associated lab is 2605.

Phys 2605. Quantum Physics Laboratory. (3 cr. Prereq–¶2601)
Laboratory experiments in atomic, solid state, and nuclear physics offered in conjunction with 2601.

Phys 3071W. Laboratory-Based Physics for Teachers. (4 cr. Prereq–College algebra)
Laboratory-based introductory physics designed for students intending to be education majors. Topics selected to apply to elementary school curriculum include the earth's motion, properties of matter, heat and temperature, kinematics, and electric current.

Phys 3940H. Junior Honors Seminar. (1 cr [max 2 cr]. Prereq–Upper div honors, #)
Designed to prepare students for senior honors thesis projects and provide guidance in choice of future careers.

Phys 3993. Directed Studies. (1-5 cr [max 10 cr]. Prereq–#, Δ)
Directed study in Physics in areas arranged by the student and a faculty member.

Phys 3994. Directed Research. (1-5 cr [max 10 cr]. Prereq–#, Δ)
Independent, directed study in physics in areas arranged by the student and a faculty member.

Phys 4001. Analytical Mechanics. (4 cr. Prereq–2601, Math 2263 or Math 2374 or Math 3574)
Analytic Newtonian mechanics. Mathematics beyond prerequisites developed as required.

Phys 4002. Electricity and Magnetism. (4 cr. Prereq–4001)
Classical theory of electromagnetic fields using vector algebra and vector calculus.

Phys 4051. Methods of Experimental Physics I. (5 cr. Prereq–2605 or equiv lab experience or #)
Contemporary experimental techniques. Introduction to modern analog and digital electronics from an experimental viewpoint. Use of computers for data acquisition and experimental control. Statistics of data analysis.

Phys 4052W. Methods of Experimental Physics II. (5 cr. Prereq–4051)
Second semester of laboratory sequence. Contemporary experimental techniques illustrated by experiments with data analysis. Students design and execute an experimental project. Lectures on specialized topics of professional concern.

Phys 4071. Concepts in Physics. (3 cr. Prereq–2201, 2303)
Overview of physics with emphasis on 20th-century developments. Primarily for secondary teachers and science majors wishing to understand the conceptual connections within physics.

Phys 4101. Quantum Mechanics. (4 cr. Prereq–2601)
Mathematical techniques of quantum mechanics. Schrödinger Equation and simple applications, general structure of wave mechanics, operator methods, perturbation theory, radiation from atoms.

Phys 4111. History of 19th-Century Physics. (3 cr. §HSci 4111. Prereq–General physics or #)
Legacy of 17th-century experimental and theoretical physics especially light, electricity, magnetism, and heat. Experimental and theoretical discoveries in 19th-century physics set within the context of concurrent educational, institutional, and political developments in Europe and the United States. Heritage of 19th-century physics.

Phys 4121. History of 20th-Century Physics. (3 cr. §HSci 4121. Prereq–General physics or #)
Experimental and theoretical discoveries in 20th-century physics (birth of modern physics, special theory of relativity, old and new quantum theories, nuclear physics to WWII) within the context of concurrent educational, institutional, and political developments in Europe and the United States.

Phys 4201. Statistical and Thermal Physics. (3 cr. Prereq–2601)
Principles of thermodynamics and statistical mechanics. Selected applications such as kinetic theory, transport theory, and phase transitions.

Phys 4211. Introduction to Solid-State Physics. (3 cr. Prereq–4101, 4201)
A modern presentation of the properties of solids. Topics include vibrational and electronic properties of solids; diffraction of waves in solids and electron band structure. Other possible topics include optical properties, magnetic phenomena, and superconductivity.

Phys 4221. Magnetism: Physics, Geophysics, and Engineering. (2 cr. §Geo 4221. Prereq–1302 or 1402)
Fundamentals of magnetism including elementary statistical mechanics, rock magnetism, and micromagnetic modeling. Important applications of magnetism in geophysics, biomagnetism, magnetic sensors, and recording will be introduced.

Phys 4303. Waves, Optics, and Relativity. (3 cr. Prereq–4001, 4002)
Further topics in analytical mechanics, electricity and magnetism including mechanical and electromagnetic wave phenomena, physical and geometrical optics, and relativistic dynamics of particles and fields.

Phys 4501. Experimental Project. (1-5 cr. Prereq–4052, #)
Research project in physics area of contemporary interest. Project must be approved by faculty coordinator before registration.

Phys 4511. Introduction to Nuclear and Particle Physics. (3 cr. Prereq–4001)
Fundamental particles and Standard Model. Symmetries/quarks, models of nuclei, interactions between particles/nuclei, tests of conservation laws, fission/fusion.

Phys 4611. Introduction to Space Physics. (3 cr. Prereq–2601, 4001, 4002)
Astrophysics of energetic particles in space, including cosmic rays and those of solar origin. Detection/identification. Interactions with matter/magnetic fields in space. Acceleration, modulation, and propagation.

Phys 4621. Introduction to Plasma Physics. (3 cr. Prereq–4001, 4002)
Magnetohydrodynamics and properties of collisionless plasmas with applications to the magnetic field of the earth and sun, and to plasma confinement. Transport phenomena and effects of collisions.

Phys 4711. Introduction to Optics. (3 cr. Prereq–4002)
Modern theoretical and experimental optics broadly defined to include, for example, radio astronomy and particle accelerators. Matrix methods in geometrical optics including charged particle opticsical detectors and noise; phenomena in intense coherent radiation including nonlinear effects.

Phys 4911. Introduction to Biopolymer Physics. (3 cr. Prereq–[2303, 2403H, 2503] or Chem 3501 or #)
Introduction to biological physics and soft condensed matter physics. Emphasizes physical ideas in experimental/theoretical understanding of biological/synthetic macromolecules/materials.

Phys 4940H. Senior Honors Seminar. (1 cr [max 2 cr]; S-N only. Prereq–Upper div honors, #)
A seminar for upper division physics majors in the honors program.

Phys 5001. Quantum Mechanics I. (4 cr. Prereq–4101 or equiv)
Schrodinger equation: bound state and scattering problems in one dimension. Spherically symmetric problems in three dimensions, angular momentum and the hydrogen atom. Approximation methods for stationary states. Time-dependent perturbation theory. Operators and state vectors: general formalism of quantum theory.

Phys 5002. Quantum Mechanics II. (4 cr. Prereq–5001 or equiv)
Symmetry in quantum mechanics, space-time symmetries and the rotation group, Clebsch-Gordan coefficients and the Wigner-Eckart theorem. Scattering theory. Method of second quantization with elementary applications. Relativistic wave equations including Dirac equation.

Phys 5011. Classical Physics I. (4 cr. Prereq–4001, 4002 or #)
Classical mechanics: Lagrangian and Hamiltonian mechanics, orbital dynamics, rigid body motion, special relativity.

Phys 5012. Classical Physics II. (4 cr. Prereq–5011 or #)
Classical electromagnetism: electrostatics, magnetostatics, Maxwell's equations, electromagnetic waves, radiation, interaction of charged particles with matter.

Phys 5022. Relativity, Cosmology, and the Universe. (4 cr. §Ast 5022. Prereq–2601 or #)
Large-scale structure and history of universe. Introduction to Newtonian and relativistic world models. Physics of early universe. Cosmological tests. Formation of galaxies.

Phys 5041. Analytical and Numerical Methods of Physics I. (4 cr. Prereq–Grad or #)
Survey of mathematical techniques, both analytic and numerical, needed for physics. Application to physical problems.

Phys 5042. Analytical and Numerical Methods of Physics II. (4 cr. Prereq–5041 or #)
Survey of mathematical techniques, both analytic and numerical, needed for physics. Application to physical problems.

Phys 5071. Physics for High School Teachers: Experimental Foundations and Historical Perspectives. (3 cr. Prereq–Gen physics, #; no cr for physics grad or grad physics minor)
In-depth examination of a conceptual theme in physics, its experimental foundations and historical perspectives. Kinematics and dynamics from Aristotle through Einstein; nature of charge and light; energy and thermodynamics; electricity, magnetism, and quantized fields; structure of matter.

Phys 5401. Physiological Physics. (4 cr. Prereq–1301 or 1401)
Musculoskeletal system, circulatory system/membrane transport, biological control systems, propagation/action potential in nervous system, biomagnetism, electromagnetism at cellular level.

Phys 5402. Radiological Physics. (4 cr. Prereq–1302 or 1402)
Signal analysis, medical imaging, medical X-rays, tomography, radiation therapy, nuclear medicine, MRI, and similar topics.

Phys 5701. Solid-State Physics for Engineers and Scientists. (4 cr. Prereq–Grad or advanced undergrad in physics or engineering or the sciences)
Crystal structure and binding; diffraction; phonons; thermal and dielectric properties of insulators; free electron model; band structure; semiconductors.

Phys 5702. Solid State Physics for Engineers and Scientists. (4 cr. Prereq–5701 or #)
Diamagnetism and paramagnetism; ferromagnetism and antiferromagnetismical phenomena; lasers; superconductivity; surface properties; ferroelectricity.

Phys 5950. Colloquium Seminar. (1 cr. Prereq–Grad or advanced undergrad in physics, Δ)

Phys 5980. Introduction to Research Seminar. (1 cr [max 3 cr]; S-N only. Prereq–Grad or upper div phys major)
Introduction to the research activities of the School of Physics and Astronomy.

Phys 5993. Directed Studies. (1-5 cr [max 15 cr]. Prereq–#, Δ)
Independent, directed study in physics in areas arranged by the student and a faculty member.

Phys 5994. Directed Research. (1-5 cr [max 15 cr]. Prereq–Jr, Δ)
Problems, experimental or theoretical, of special interest to students. Written reports.

Physiology (Phsl)

Department of Physiology

Medical School

Phsl 1001. Human Physiology. (3 cr. Prereq–High school chem, high school biol)
How major organ systems function (nerve, muscle, circulation, respiration, endocrine, renal, gastro-intestinal, temperature regulation and energy metabolism). Function in terms of mechanism. Ideas presented in terms of scientific concepts and methods, although a scientific background is not assumed.

Phsl 3051. Human Physiology. (4 cr. Prereq–1 yr college biol, 1 yr college chem)
For pre-allied health sciences majors. How major organ systems function (nerve, muscle, circulation, respiration, endocrine, renal, gastrointestinal, temperature regulation and energy metabolism). Fall offering emphasizes independent learning using e-mail extensively for information exchange between students and faculty. One-hour lecture, two-hour lab.

Phsl 3061. Principles of Physiology. (4 cr. Prereq–1 yr college chem and physics and math through integral calculus)
Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, gastrointestinal, renal, endocrine, muscle, peripheral and central nervous systems), cellular transport processes, and scaling in biology.

Phsl 3071W. Principles of Physiology for Majors. (5 cr; A-F only. Prereq–Physiology major, 1 yr college chem and physics and math through integral calculus)
Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, gastrointestinal, renal, endocrine, muscle, peripheral and central nervous systems), cellular transport processes, and scaling in biology. Papers on current topics of interest based on published laboratory research required.

Phsl 3095. Problems in Physiology. (1-5 cr [max 20 cr]. Prereq–¶college physiology, #)
Individualized study in physiology. Students address a selected problem in physiology through library or lab research, supervised by physiology faculty.

Phsl 3101. Introduction to Neuroscience I: From Molecules to Madness. (3 cr; A-F only. §Biol 3101, §NSc 3101. Prereq–Biol/BioC 3021 or BioC 4331, Biol 4004 or ¶4004)
Basic principles of cellular and molecular neurobiology and nervous systems.

Phsl 3701. Physiology Laboratory. (2 cr; A-F only. Prereq–[3061 or 3071 or ¶3061 or ¶3071], #)
Laboratory experiments in physiology. Emphasizes quantitative aspects, including analysis of organ systems.

Phsl 4095. Honors Problems in Physiology. (2-4 cr [max 4 cr]; A-F only. Prereq–¶3071, physiology honors candidate, permission of the director of undergraduate studies in physiology)
Students pursue a selected topic in physiology through library or laboratory research supervised by physiology faculty. Not suitable for graduate credit.

Phsl 5061. Principles of Physiology for Biomedical Engineering. (4 cr. Prereq–Biomedical engineering grad, one yr college chem and physics and math through integral calculus)
Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, renal, gastrointestinal, endocrine, muscle, central and peripheral nervous systems), cellular transport processes, and scaling in biology.

Phsl 5094. Research in Physiology. (1-5 cr [max 20 cr]. Prereq–#)
Independent lab research project in physiology, supervised by physiology faculty.

Phsl 5095. Problems in Physiology. (1-5 cr [max 20 cr]. Prereq–#)
Individualized study in physiology. Students address selected problem through library or lab research, supervised by physiology faculty.

Phsl 5101. Human Physiology. (5 cr; A-F only. Prereq–Grad student in biomedical sciences)
Survey of human physiology. Muscle, cardiovascular, respiratory, gastrointestinal, renal physiology. Integrative, systems approach. Emphasizes normal function.

Phsl 5201. Computational Neuroscience I: Membranes and Channels. (3 cr. Prereq–Calculus through differential equations)
Neural excitation (ion channels, excitation models, effects of neural morphology) using UNIX workstations to simulate empirical results. Includes the Hodgkin-Huxley model, nonlinear dynamic systems analysis, voltage and ligand gated ion channels, ion transport theories, and impulse initiation and propagation.

Phsl 5202. Computational Neuroscience II: Neural Systems and Information Processing. (3 cr. Prereq–Understanding of UNIX, Phsl/NSc 5201 or equiv)
Quantitative examination of information processing by networks based on experimental data and theoretical models. Neural codes, neural network models and information processing, neural control systems, computational maps.

Phsl 5444. Muscle. (3 cr. §BioC 5444, §MDBC 5444 §VPB 5444. Prereq–3061 or 3071 or 5061 or BioC 3021 or BioC 4331 or #)
Muscle membranes: structures, mechanisms, and physiological roles of channels/pumps. Muscle contraction: force generation by actin/myosin.

Phsl 5510. Advanced Cardiac Physiology and Anatomy. (2-3 cr. Prereq–#)
Fundamental concepts, advanced topics related to clinical/biomedical cardiac physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course.

Phsl 5511. Advanced Neuromuscular Junction Physiology. (2-3 cr. Prereq–#)
Fundamental concepts and advanced topics related to clinical/biomedical aspects of neuromuscular junction physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one-week course.

Phsl 5520. Advanced Pulmonary Mechanics: Physiology and Pathophysiology. (2-3 cr. Prereq–#)
Fundamental concepts and advanced topics related to mechanical aspects of pulmonary function (e.g., elastic recoil, airway resistance). Lectures, laboratories, demonstrations. Intense, one-week course.

Phsl 5701. Physiology Laboratory. (1-2 cr [max 2 cr]; A-F only. Prereq–#)
Experiments in physiology. Emphasizes quantitative aspects, including analysis of organ systems.

Plant Biology (PBio)

Department of Plant Biology
College of Biological Sciences

PBio 1212. Plants and Society. (3 cr. Prereq–for majors and nonmajors)
Roles that plants play and have played in human biological and cultural development.

PBio 4321. Taxonomy of Minnesota Flora. (3 cr. Prereq–Biol 2022 or Biol 3007)
Identification of common vascular plants of Minnesota and surrounding region; distinguishing characteristics of local taxa; descriptive terminology; use of manuals of floras. Includes lab and field trips.

PBio 4404. Developmental Plant Anatomy. (3 cr. Prereq–Biol 2022 or Biol 3007)
Introduction to the microscopic structure and development of plants at the cell, tissue, and organ level. Emphasis on relationships between anatomy and the ontogeny, phylogeny, and ecology of seed plants with some reference to lower vascular plants.

PBio 4511. Flowering Plant Systematics. (3 cr. §PBio 4811. Prereq–Biol 2022 or Biol 3007)
Systematics of flowering plants of the world. Ecology, geography, origins, and evolution. Family characteristics. Floral structure, function, evolution. Pollination biology. Methods of phylogenetic reconstruction. Molecular evolution. Taxonomic terms. Methods of collection/identification.

PBio 4793W. Directed Studies: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Individual study on selected topics or problems. Emphasizes readings, use of scientific literature. Written report.

PBio 4794W. Directed Research: Writing Intensive. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Laboratory or field investigation of selected areas of research, including written report.

PBio 4801. Plains and Boreal Flora. (4 cr; A-F only. Prereq–Taxonomy course, Δ)
Survey of state summer flowering plants and ferns with particular reference to local flora. Identification of important plant families using technical keys, and field recognition of common species and habitat preferences; collecting methods, literature, and taxonomic methods.

PBio 4811. Flowering Plant Systematics. (3 cr. §PBio 4511. Prereq–[Biol 2022 or Biol 3007], Δ)
Systematics of flowering plants of the world. Ecology, geography, origins, and evolution. Family characteristics. Floral structure, function, evolution. Pollination biology. Methods of phylogenetic reconstruction. Molecular evolution. Taxonomic terms. Methods of collection/identification. Field work.

PBio 4993. Directed Studies. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature.

PBio 4994. Directed Research. (1-7 cr [max 7 cr]; S-N only. Prereq–#, Δ)
Laboratory or field investigation of selected areas of research.

PBio 5109. Current Questions in Fungal Biology. (2 cr; A-F only. Prereq–Biol 4003 or GCB 3022)
Diversity of fungi and their interactions with other organisms. Pathogenic and mutualistic interactions with animals and plants. Use of fungal systems for drug discovery and understanding pathogenicity, signal transduction, morphogenesis, and evolution.

PBio 5301. Plant Genomics. (3 cr. Prereq–[Intro course in genetics, intro course in biochemistry] or #)
Introduction to genomics. Emphasizes plants and relevant model organisms. DNA marker/sequencing technology, comparative genomics, whole genome sequencing, DNA chips/microarrays, EST libraries and SAGE analysis, gene-knockout systems, genome databases, sequence comparison/clustering algorithms, visualization tools.

PBio 5412. Plant Physiology. (3 cr. Prereq–Biol 2022 or Biol 3002 or Biol 3007, Biol/BioC 3021 or BioC 4331)
Physiological and biochemical bases of plant systems with emphasis on higher plants.

PBio 5414. Plant Cell and Molecular Biology. (3 cr. Prereq–Biol 2022 or Biol 3007 or Biol 3002, Biol/BioC 3021 or Biol 4003 or GCB 3022)
Aspects of recombinant DNA technology and other technologies in cell and molecular biology. Appropriate for those without extensive background in these areas but who wish to understand the potential uses of current cell and molecular technologies in the plant sciences.

PBio 5416. Plant Morphology, Development, and Evolution. (4 cr. Prereq–Biol 2022 or Biol 3002 or Biol 3007)
Evolutionary history of land plants. Morphological changes in vegetative and reproductive structures. Morphology of green algal ancestors, nonvascular land plants, and spore bearing and seed bearing vascular plants are analyzed in an evolutionary framework.

PBio 5640. Discussions in Plant Molecular Biology. (2 cr [max 4 cr]. §PBio 5414. Prereq–Biol 3002, Biol 4003, GCB 5034 or ¶GCB 5034)
Selected topics in plant molecular biology for students with a strong interest in the subject. Classical and recent papers that have led to current understanding of transposable elements, genomic structure and function, mechanisms of hormone action and gene regulation.

PBio 5960. Special Topics. (1-3 cr [max 6 cr]. Prereq–Biol 2022 or Biol 3002 or Biol 3007)
In-depth treatment of specialized topics in plant biology.

Plant Pathology (PlPa)

Department of Plant Pathology

College of Agricultural, Food and Environmental Sciences

PlPa 1001. Microbes, Plants, and People: The Social and Economic Impact of Plant Disease. (3 cr)
The positive and negative effects of microorganisms on plants and their ultimate effects on human history, economics, and society.

PlPa 1002. Plant Diseases and Your Garden. (2 cr)
Characteristics and causes of diseases that can affect the growth of plants with emphasis on flowers, small fruits, and vegetables. In-depth study of 18 different plant diseases that may appear in your garden, why they occur, and how to avoid them.

PlPa 1003. All About Mushrooms. (2 cr)
Recognition of edible, poisonous, common, or conspicuous forms of mushrooms as well as mushroom folklore, art and recipes, and ecology. Field trip. For students with some elementary biology but no formal education in mycology.

PlPa 1004. Diseases of Turfgrasses. (2 cr; A-F only)
Turfgrass diseases, insect/nematode problems, role of turfgrass ecology in disease development. Tools to diagnose/provide recommended strategies for turfgrass diseases. Safe/effective pesticide strategies, integrated pest management plans for management.

PlPa 2001. Introductory Plant Pathology for Horticulturalists. (3 cr. Prereq–Biol 1009 or equiv)
Pathogens that cause plant disease; symptoms resulting when susceptible plants and causal agents interact, roles the environment and physio-chemical stresses have on incidence and severity of plant disease, and examples of how techniques of plant disease control may be integrated.

PlPa 2002. Management and Control of Field Crop Diseases. (3 cr. Prereq–Biol 1009 or equiv)
Dynamics of plant pathogens, their control in plant disease. Crops discussed (i.e., small grain, corn, soybeans, potatoes, sugar beets, dry beans) are found in common rotations practiced in Minnesota.

PlPa 3001. Plant Disease Biology and Management. (1 cr. Prereq–Biol 1009 or equiv)
Introduction to organisms that cause plant diseases. Symptoms of plant diseases, economic losses due to plant diseases, and chemical and biological strategies for managing plant diseases will be discussed.

PlPa 3002. Air Pollution, People, and Plants: The Science and the Ethics. (3 cr. Prereq–Chem 1021, 1022; Biol 1009 or equiv)
History of air pollution, its sources and types; global climate change; air pollution effects on human health, crops and forests; air pollution control and international perspective; risk perception and assessment; public ethics and decision making.

PlPa 3003. Diseases of Forest and Shade Trees. (3 cr)
Diseases of trees in urban and forested areas. Biology, ecology and control of tree diseases. Labs provide experience identifying disease agents and learning appropriate integrated control procedures.

PlPa 3090. Research in Plant Pathology. (2-4 cr)
Assignment of special problems to undergraduates desiring opportunity for independent research in plant pathology.

PlPa 4000. Plant Pathology Practicum. (1 cr [max 5 cr]. Prereq–2000 or 2002, environmental hort majors should be jr or sr)
Analysis and identification of plant disease problems facing horticultural or agricultural enterprises. Develop procedures and practices that have the potential to improve existing programs for plant disease management in those businesses.

PlPa 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; S-N only. Prereq–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering)
Supervised practicum with professional experience in plant pathology and related industries including the Plant Disease and "Dial-U" clinics. Evaluative reports and consultations with faculty advisers and employers.

PlPa 5003. Diseases of Forest and Shade Trees. (3 cr)
Diseases of trees in urban and forested areas. Biology, ecology, and control of tree diseases. Identifying disease agents, integrated control procedures. Laboratory.

PlPa 5090. Issues in Plant Pathology. (2-4 cr)
See *Class Schedule* or department for current offerings.

PlPa 5102. Epidemiology and Genetics of Host-Parasite Interactions. (3 cr; A-F only. Prereq–[5201 or equiv], GCD 3022)
Concepts/methodology in study of plant disease epidemics, host plant resistance, and host-parasite genetics. Disease assessment, epidemic progress models, environmental influences, crop loss assessment, disease forecasting, ecology of host-parasite. Environmentally sound management strategies. Use of resistance for disease control.

PlPa 5103. Physiological and Molecular Plant-Microbe Interactions. (3 cr)
Genetics, physiology, molecular biology of plant-microbe interactions. Communication between plant/microbes, signal transduction, control of gene expression, symbiosis/parasitism, plant host response mechanisms, plant disease physiology.

PlPa 5201. Biology of Plant Diseases. (4 cr. Prereq–Biol 1009 or equiv)
Principles and concepts of plant disease caused by selected viruses, bacteria, fungi, nematodes, and environmental factors. Pathogen biology, interaction of pathogens and the environment; epidemiology and control measures appropriate to plant disease.

PlPa 5202. Field Plant Pathology. (2 cr. Prereq–#)
Characteristics of a variety of plant diseases. Field trips to observe symptoms and effects of diseases, and to learn about prevention and control of diseases in field, forest, golf course, greenhouse, nursery, orchard, and urban environments.

PlPa 5203. Biology and Ecology of Fungi. (3 cr. Prereq–Biol 1009 or equiv)
Major groups of fungi, their roles in ecosystems and human society, environmental and nutritional needs, and modes of dissemination and survival. Representative species of fungi observed and manipulated.

PlPa 5204. Plant Disease Management. (3 cr; A-F only. Prereq–3001 or 3002)
Principles of crop/pathogen biology, epidemiology, crop ecology, crop management practices that influence occurrence of plant disease. Interaction of crop management practices with plant disease. Strategies for controlling plant disease through management practices illustrated by examples from agronomic, horticultural, forest crops.

PlPa 5301. Plant Genomics. (3 cr. Prereq–Intro course in genetics or #)
Introduction to genomics. Emphasizes plants and relevant model organisms. DNA marker/sequencing technology, comparative genomics, whole genome sequencing, DNA chips/microarrays, EST libraries and SAGE analysis, gene-knockout systems, genome databases, sequence comparison/clustering algorithms, visualization tools.

PlPa 5999. Special Workshop in Plant Pathology. (1-4 cr)
Workshops on a variety of topics in plant pathology offered at locations other than the Twin Cities campus. See *Class Schedule* or department for current offerings.

Polish (Plsh)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

Plsh 1101. Beginning Polish. (5 cr)
Develop basic proficiency in listening, speaking, reading, and writing and become acquainted with Polish culture. First of four courses designed to satisfy CLA language graduation requirement.

Plsh 1102. Beginning Polish. (5 cr. Prereq–1101 or equiv)
Develop basic proficiency in listening, speaking, reading and writing and to acquaint students with Polish culture. Second of four courses designed to satisfy CLA language graduation requirement.

Plsh 3001. Intermediate Polish. (5 cr. Prereq–1102 or equiv)
Conversation, composition, advanced grammar, translation, and readings in appropriate literature. Third of four courses designed to satisfy CLA language graduation requirement.

Plsh 3002. Intermediate Polish. (5 cr. Prereq–3001 or equiv)
Conversation, composition, advanced grammar, translation, and readings in appropriate literature. Fourth in a sequence of courses designed to satisfy CLA language graduation requirement.

Plsh 3601. Survey of Polish Literature: Baroque through Romanticism. (3 cr)
Reading and analysis of major works of Polish literature from Baroque through Romanticism.

Plsh 3602. Survey of Polish Literature: 1863 to the Present. (3 cr)
Reading and analysis of major works of Polish literature from 1863 to the present.

Plsh 5900. Topics. (1-4 cr)
Topics specified in *Class Schedule.*

Plsh 5993. Directed Readings. (1-3 cr)
Guided individual reading or study in Polish language, literature, and culture.

Political Science (Pol)

Department of Political Science

College of Liberal Arts

Pol 1001. American Democracy in a Changing World. (4 cr. §1002)
Introduction to politics and government in the United States. Constitutional origins and development, major institutions, parties, interest groups, elections, participation, public opinion. Ways of explaining politics and the nature of political science. Recent trends emphasized.

Pol 1001H. Honors Course: American Democracy in a Changing World. (4 cr. §1001, §1002. Prereq–Honors)
Introduction to politics/government in the United States. Constitutional origins/development, major institutions, parties, interest groups, elections, participation, public opinion. Ways of explaining politics, nature of political science. Emphasizes recent trends.

Pol 1015. Mass Politics in a Media Age. (3 cr)
In a world of sound bites, soft news, and ubiquitous information/images, do we make rational voting decisions? Are we politically engaged? Do politicians, the media, and political institutions promote or obstruct our efforts to be good citizens? What does responsible citizenship entail? What can be done to enhance citizenship?

Pol 1019. Indigenous Peoples: A Global Perspective. (3 cr; A-F only. §AmIn 1002)
Colonial experiences of selected indigenous peoples in Americas, Euroasia, Pacific Rim.

Pol 1025. Global Politics. (4 cr)
Study of international relations and issues in contemporary world affairs. Forms of state interaction from violent conflict to cooperation and integration; activities of international institutions; transnational relations involving non-state actors such as international businesses, human rights networks, and environmental movements.

Pol 1026. We and They: U.S. Foreign Policy. (4 cr)
Contemporary foreign policy issues; how the United States makes foreign policy in a global era; historical background. How two regions (such as the Middle East and China) affect and are affected by U.S. policy.

Pol 1054. Repression and Democracy Around the World. (4 cr)
Introduction to political life in all its worldwide variety. Focus on repression, democracy, rights, corruption, gender, and political change. Guest lectures by political science professors who are experts on different parts of the world. Non-majors welcome.

Pol 1065. Government and Medicine. (3 cr)
Structure of American government as background for competing models of health policy making. Political struggles over government policy as means for peaceably reconciling competing interests, demands, and values. Tension between (a) technocratic assumption that experts are best equipped to make national policy and (b) democratic principle/practice of popular consent and wide political participation/conflict.

Pol 1201. Political Ideas and Ideologies. (4 cr)
Analysis of key concepts and ideas (e.g., freedom, equality, democracy) as they are constructed by major theories and ideologies (liberalism, conservatism, socialism, etc.).

Pol 1902. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule*.

Pol 1903. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule*.

Pol 1908W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule*.

Pol 1909W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule*.

Pol 3051. Power and Choice: Who Gets What, When, and Why. (3 cr)
Introduction to major concepts and issues in political science including political participation, policy making; justice, legitimacy, political development, and types of political systems. Explore empirical and normative problems and compare among major countries.

Pol 3070. Faculty-Supervised Individual Field Work. (1-12 cr [max 12 cr]; A-F only. Prereq–#, Δ)
Faculty-supervised research related to work in political or governmental organizations.

Pol 3080. Faculty-Supervised Individual Internships. (4-12 cr [max 15 cr]; A-F only. Prereq–#, Δ)
Internship with government or community organizations arranged by the department and awarded competitively each spring semester.

Pol 3085. Quantitative Analysis in Political Science. (4 cr; A-F only. Prereq–9 cr in social sciences or #)
Introduction to empirical research techniques, or how one tests a political hypothesis using data. Topics such as setting up a research question in political science, proper research design, and some basic techniques of data analysis.

Pol 3109H. Honors Course: Researching Politics. (3 cr; A-F only. §3109. Prereq–Jr, pol sci, honors)
Give students a start on their honor theses. Research design, methods of data collection/analysis, strategies for scholarly writing. Meets each spring.

Pol 3110H. Honors Thesis Credits. (1-4 cr [max 4 cr]; A-F only. §3110. Prereq–3109, pol sci, honors)
Individual research/writing of departmental honors thesis.

Pol 3210. Practicum. (1-3 cr [max 6 cr]. Prereq–#)
Offers different kinds of out-of-class opportunities to complement the readings, assignments, and objectives of a parent course in political science. Opportunities vary according to demands of the parent course.

Pol 3215. Current Controversies and Problems in Politics. (3 cr)
Exploration and examination of contemporary controversies in American politics (e.g., affirmative action, health care, abortion, euthanasia) as they affect questions of citizenship and cultural diversity.

Pol 3225. American Political Thought. (3 cr)
Puritans, American Revolution, Constitution, pro- and anti-slavery arguments, civil war and reconstruction, industrialism, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, women's suffrage, red scares, Great Depression, United States as world power, free speech, pluralism and multiculturalism.

Pol 3235W. Democracy and Citizenship. (3-4 cr. Prereq–1201 recommended)
Surveys models of democracy based on individual rights; pluralism; civic republicanism; community activism. Examines dilemmas of democratic government and citizenship in a race, class, and gender-stratified society; explores its possibilities in a changing world.

Pol 3251. Greeks, Romans, and Christians: Ancient and Medieval Political Thought. (3-4 cr. §5251)
Politics and ethics in Greece, Rome, Christendom: Thucydides, Socrates, Plato, Aristotle, Cicero, Augustine, Aquinas, Marsilius.

Pol 3252. Renaissance, Reformation, and Revolution: Early Modern Political Thought. (3-4 cr. §5252)
Thinkers, themes, and discourses from the Renaissance to the French Revolution. Renaissance Humanists; Machiavelli; More; Reformation; Luther; Calvin; Natural Law; Grotius; Divine Right; Common Law; Bacon; English Revolutionaries; Hobbes; Locke; Astell; Enlightenment; Rousseau; French Revolutionaries; Hume; Burke; Wollstonecraft.

Pol 3253. Modernity and Its Discontents: Late Modern Political Thought. (3-4 cr. §5253)
Theoretical responses to and rival interpretations of Western economy, society, politics, and democratic culture in the modern age; theories of history; class struggle; end of metaphysics and death of God; technology and bureaucracy; psychology of culture in Hegel, Marx, Tocqueville, Mill, Nietzsche, Weber, Freud.

Pol 3321. Issues in American Public Policy. (3 cr. Prereq–1001 or equiv or #)
Analysis of the politics of the policy process including agenda formation, formulation, adoption, implementation, evaluation. Attention to selected policy areas.

Pol 3323. Political Tolerance in the United States. (3-4 cr)
Political importance of civil liberties in American society. Tolerance as a political phenomenon. Issues such as free speech, privacy, religion, race, gender.

Pol 3352W. Fieldwork in the Legislature. (3 cr. Prereq–1001 or equiv)
Field study of Minnesota Legislature; campaigns and elections, party leadership, committee structure, staffing, lobbying, relations with other branches. Students arrange work assignments with legislators.

Pol 3441. Politics of Environmental Protection. (3 cr. Prereq–§5441; jr or sr social science major)
How the American political system deals with environmental issues, how third world countries deal with problems of environmental protection and economic growth, and the way the international community deals with global environmental problems.

Pol 3451W. Politics and Society in the New Europe. (3 cr. Prereq–3051 or Soc 1001 or #)
Explores the changing politics and society of the new Europe. Particular focus on generational change and values, political parties, welfare state, the future of European integration, and political stability and democratization.

Pol 3477. Political Development. (3-4 cr. Prereq–1054 or 3051 or #)
Political processes and problems associated with economic development; the political economy of underdevelopment and development; problems of state building and the development of political institutions.

Pol 3491. Film and the Study of Latin American Politics. (3 cr. Prereq–1054 recommended)
Introduction to using film to study Latin American politics. Hollywood films explore how the United States "sees" Latin America, its people, and its political problems; films from Latin America explore how Latin American popular culture reflects a country's political issues. One feature film per week. Brief readings about issues raised by each film.

Pol 3701. American Indian Tribal Governments and Politics. (3 cr; A-F only. §AmIn 3501)
History, development, structure, politics of American Indian Governments. North American indigenous societies from pre-colonial times to present. Evolution of aboriginal governments confronted/affected by colonizing forces of European/Euro-American states. Bearing of dual citizenship on nature/powers of tribal governments in relation to states and federal government.

Pol 3739. Politics of Race, Class, and Ethnicity. (3-4 cr. Prereq–6 cr in social science)
An introductory examination of how race, ethnicity, and class interact in the political process with particular attention to political conflict through comparative analysis of the United States, South Africa, and Brazil.

Pol 3751. Fieldwork in Politics. (3 cr. Prereq–1001 or equiv or #)
Field study of political organizations, leadership, campaigns. Students arrange work assignments with candidates.

Pol 3766. Political Psychology. (3 cr. Prereq–1001 or equiv or #)
Examines how political behavior of citizens and political elites is shaped by psychological factors including personality, attitudes, values, emotions, and cognitive sophistication. Topics include political activism and apathy, leadership charisma, mass media, group identifications, and political culture.

Pol 3835. International Relations. (3 cr)
Introduction to the theoretical study of international relations. Students learn to appreciate how the choice of theoretical perspectives shapes one's understandings of the structure and practices of global politics.

Pol 3872W. Global Environmental Cooperation. (4 cr. §5872)
Emergence of the environment as a key aspect of the global political agenda. Non-governmental and governmental international organizations. Politics of protection of the atmosphere, rain forest, seas, and other selected issues. International security and the environment.

Pol 3873W. Global Citizenship and International Ethics. (3 cr)
Case studies of ethics in intervention, war, weapons, foreign aid, environmental practices, and human rights are used to examine the global ethical responsibilities of individual citizens and public officials; effectiveness of transnational social movements in influencing policy at domestic and international levels.

Pol 4210. Topics in Political Theory. (3-4 cr [max 8 cr]; A-F only. Prereq–¶3210, Δ)

Pol 4275. Contemporary Political Thought. (3 cr. Prereq–1201 recommended)
The 20th-century crisis of Western humanism in major works of contemporary political thought from World War II to the present. Relationships between force and freedom; ideology and truth; authority and resistance. Thinkers may include Arendt, Camus, Beauvoir, Fanon, Foucault, Habermas, Rawls, Sartre, Said. Ideas may include communitarianism, feminism, postcolonialism, postmodernism, socialism.

Pol 4280. Topics in Political Theory. (3-4 cr [max 8 cr])
Topics in historical, analytical, or normative political theory. Topics vary.

Pol 4303. American Democracy in Crisis. (3-4 cr. Prereq–1001 or equiv, non-pol sci grad major or #)
Compare the performance of the American political system with the promises of democracy. Discuss a range of interpretations of democratic government and the American national governing process.

Pol 4306. Presidential Leadership and American Democracy. (3-4 cr. Prereq–1001 or equiv, non-pol sci grad major or #)
No single individual in the American political system is the subject of such high expectations as the president. Examine whether the president's political and constitutional powers are sufficient to satisfy the high expectations that Americans have of him. Should presidents be expected to dominate American politics?

Pol 4308. Congressional Politics and Institutions. (3-4 cr. Prereq–[[1001 or 1002], non-pol sci grad major] or #)
Origin/development of U.S. congressional institutions, parties, committees, leaders, lobbying/elections, and relations between Congress/executive branch. Relationship of campaigning/governing, nature of representation, biases of institutional arrangements.

Pol 4309. Justice in America. (3 cr. Prereq–1001 or 1002, non-pol sci grad major or equiv or #)
The American judiciary, the selection of judges and how and why these individuals and institutions behave the way they do. What influences judicial decisions? What impact do these decisions have? Why do people comply with them?

Pol 4310. Topics in American Politics. (3 cr. Prereq–1001 or equiv or #)
See *Class Schedule* for description.

Pol 4315W. State Governments: Laboratories of Democracy. (4 cr. Prereq–1001 or equiv, non-pol sci grad major or #)
Political behavior, governmental institutions, and public policies in American states; comparison among states, between state and national government, with special attention given to Minnesota.

Pol 4322. Rethinking the Welfare State. (3-4 cr)
Discuss competing arguments about welfare states in advanced industrial countries. Are welfare states the result of sectional interests, class relations, or citizenship rights? Compare American social policy with policies in other western countries.

Pol 4327. The Politics of American Cities and Suburbs. (3 cr. Prereq–1001 or 1002, non-pol sci grad major or equiv or #)
Development and role of American local government; forms and structures; relationships with states and the federal government; local politics and patterns of power and influence.

Pol 4331. Thinking Strategically in Domestic Politics. (3-4 cr)
A survey of applications of rational-choice and game theories to important features of domestic politics in the United States and elsewhere.

Pol 4410. Topics in Comparative Politics. (3 cr)
Topics of current analytical or policy importance to comparative politics. Topics vary.

Pol 4461W. European Government and Politics. (4 cr. Prereq–Pol 1054 or 3051 or non-political science graduate student or #)
European political institutions in their social settings; power and responsibility; governmental stability; political decision making, government and economic order.

Pol 4467. Politics and Market in Contemporary Japan. (3-4 cr. §EAS 4467. Prereq–1054 or 3051 or n on-pol sci grad or #)
Study how Japan combined rapid economic development and social stability in the postwar period and the strengths and the weakness of the Japanese model of capitalism, particularly in today's new "globalized" world.

Pol 4471. After Communism: Russia and the Commonwealth of Independent States. (3-4 cr. Prereq–1054 or 3051 or non-pol sci grad or #)
Politics of the newly independent states of the former Soviet Union, particularly Russia. Political transformation, the sources of political stability and instability, economic reform, and the problems of a multinational state.

Pol 4473. Chinese Politics. (3 cr. §EAS 4473)
Focuses on fundamental conflicts in Chinese society; the democracy movement, human rights, class divisions, gender struggles, environmental issues, and capitalist vs. socialist development strategies. Secondary topics include Chinese foreign relations and domestic and foreign political issues in Taiwan.

Pol 4477. Struggles and Issues in the Middle East. (4 cr. Prereq–1054 or 3051 or non-pol sci grad or #)
Turkey, Iran, Israel, and selected Arab states. Domestic politics of religious/secular, ethnic, economic, environmental, and other policy/identity issues. Regional politics of water access, Israeli/Palestinian/Arab world relationships, oil and the Persian/Arabian Gulf, and human rights.

Pol 4478. Contemporary Politics in Africa and the Colonial Legacy. (4 cr. Prereq–1054 or 3051 or non-pol sci grad or #)
Examines how current politics in mainly, though not exclusively, sub-Saharan Africa have been shaped by the pre-colonial and colonial processes. Reality of independence; recurrent political and economic crises, global context and prospects for effective democracy.

Pol 4479. Latin American Politics. (3 cr. §LAS 4479. Prereq–1054 or 3051 or non-pol sci grad or #)
An overview of Latin American politics and political economy focused on authoritarianism, human rights, and redemocratization; development and economic policy; social movements; ethnicity and race; religion; revolution; U.S.-Latin American relations.

Pol 4481. Governments and Markets. (3-4 cr. Prereq–1054 or 3051 or non-pol sci grad or #)
Study the connection between democracy and markets with attention to the experiences of countries in North America and Europe.

Pol 4483. Grassroots Politics. (3-4 cr)
Politics from the bottom up: politics of daily life, powerlessness, workplace politics, everyday resistance, local organizing, protest, rebellion, and social movements.

Pol 4485. Human Rights and Democracy in the World. (3 cr. Prereq–At least one 1xxx or 3xxx course in pol sci, non-poll sci major or #)
Examine the question of human and democracy rights in global and comparative perspectives. Explore the history of ideas about human rights and democracy and contrast economic, political, psychological, and ideological explanations for repression.

Pol 4487. The Struggle for Democratization and Citizenship. (4 cr. Prereq–Non-pol sci grad)
Traces the origins of the democratic process with particular emphasis on how the disenfranchised fought to become included. Begins with the history of the democratic movement from its earliest moments in human history to the present and attempts to draw a balance sheet.

Pol 4501. The Supreme Court and Constitutional Interpretation. (3 cr. Prereq–1001 or 1002 or equiv or [non-pol sci] grad student or #)
Historical/analytical approaches to Court's landmark decisions. Explores theory/techniques of judicial review. Relates Court's authority to wider political/social context of American government.

Pol 4502. The Supreme Court, Civil Liberties, and Civil Rights. (3 cr. Prereq–1001 or 1002 or equiv or [non-pol sci] grad major or #)
Supreme Court's interpretation of Bill of Rights, 14th amendment. Focuses on freedom of speech, press, religion; crime/punishment; segregation/desegregation, affirmative action; abortion/privacy.

Pol 4523. The Politics of the Regulatory Process. (3 cr. Prereq–1001 or 1002 or equiv or #, 4309 or 4501 or sr or non-pol sci grad major)
Operations of regulatory agencies considered in context of political and legal environment. Principles of federal administrative law, informal procedures, interest group activity; philosophy of regulation; politics and processes of deregulation.

Pol 4525. Federal Indian Policy. (3 cr; A-F only. §AmIn 4525)
Formulation, implementation, evolution, comparison of Indian policy from pre-colonial times to self-governance of new millennium. Theoretical approaches to federal Indian policy. Major federal Indian policies. Views/attitudes of policy-makers, reactions of indigenous nations to policies. Effect of bodies of literature on policies.

Pol 4561. Comparative Legal Systems. (3 cr. Prereq–Jr or sr or non-pol sci grad major)
Survey of the principal legal systems of the Western world. Examine the role of the legal system in relation to various political and economic systems and the contrast between the common law and civil law traditions.

Pol 4737. American Political Parties. (3-4 cr. Prereq–1001 or equiv or #)
The American two-party system; party influence in legislatures and executives; decline of parties and their future.

Pol 4766. American Political Culture and Values. (3-4 cr. Prereq–1001 or equiv or non-pol sci grad major or #)
Empirical analysis of basic political values—individualism, freedom, and equality; dominant beliefs about democratic principles, materialism, capitalism, citizenship, patriotism and heroism.

Pol 4767. Public Opinion and Voting Behavior. (3 cr. Prereq–1001 or equiv or #)
Major factors influencing electoral decisions and political attitude formation/change. Data analysis lab required.

Pol 4810. Topics in International Politics and Foreign Policy. (3-4 cr [max 8 cr])
Analysis of selected issues in contemporary international relations. Topics vary.

Pol 4832. Defending America: U.S. Security Policy. (3-4 cr)
History of U.S. security doctrine. Examination of major issues in present U.S. security policy (e.g., the future of NATO, nuclear strategy in the absence of a clear enemy, nuclear and chemical international arms control). The political and bureaucratic process of making U.S. defense policy.

Pol 4833. The U.S. in the Global Economy. (3-4 cr. Prereq–3835 recommended)
Domestic and international politics of United States, foreign economic policy (trade, aid, investment, monetary, and migration policies). Effects of policies and international economic relations on the U.S. economy and U.S. politics.

Pol 4836. Making Foreign Policy: Perceptions and Decisions. (3-4 cr. Prereq–Non-pol sci grad)
Foreign policy decision making beyond the "to serve the national interest" cliche. Theoretic understandings from the study of culture, political psychology, organizational theory, democratic theory, bureaucratic politics, game theory, and political economy. Decision making in cross-cultural settings.

Pol 4881. International Law. (3 cr. Prereq–3835 or non-pol sci grad or #)
How international law matters for world politics. Lectures, discussions, and simulations of cases examine key concepts and theories of international law. Topics include war crimes, human rights, law of the sea, the environment, and international crime.

Pol 4883. Global Governance. (3 cr. Prereq–3835 or non-pol sci grad or #)
Seminar discussions and class simulations examine the rise and role of inter-governmental organizations such as the United Nations and non-governmental organizations. Topics include peacekeeping, trade, development, human rights, security and arms control, self-determination, refugees, health, and the environment.

Pol 4885. International Conflict and Security. (3-4 cr)
An examination of alternative theories of the sources of militarized international conflict. Apply these theories to one or more past conflicts and discuss their relevance to the present.

Pol 4887. Thinking Strategically in International Politics. (3 cr; A-F only)
Survey of applications of game theory to international politics; conflict and cooperation, global environmental commons, deterrence and reputation.

Pol 4889. Governments and Global Trade and Money. (3-4 cr. Prereq–3835 or non-pol sci grad or #)
Study the politics of international trade and monetary affairs including north-south and east-west relations

Pol 4900V. Honors: Senior Paper. (1 cr; A-F only. Prereq–Honors, pol sr, #)
Can be attached to any 3xxx or 4xxx course. A 10-15 page paper is submitted for evaluation/advice by instructor, then revised for final submission.

Pol 4900W. Senior Paper. (1 cr; A-F only. Prereq–Pol sr, #)
Can be attached to any 3xxx or 4xxx course (with the agreement of that course's instructor). A 10-15 page paper is submitted for evaluation/advice by instructor, then revised for final submission.

Pol 4970. Individual Reading and Research. (1-4 cr [max 1 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Pol 5210. Topics in Political Theory. (3 cr [max 9 cr]; A-F only. §4210. Prereq–¶3210, Δ, grad)

Pol 5251. Greeks, Romans, and Christians: Ancient and Medieval Political Thought. (4 cr. §3251)
Politics and ethics in Greece, Rome, Christendom: Thucydides, Socrates, Plato, Aristotle, Cicero, Augustine, Aquinas, Marsilius.

Pol 5252. Renaissance, Reformation, and Revolution: Early Modern Political Thought. (4 cr. §3252)
Thinkers, themes, and discourses from the Renaissance to the French Revolution. Renaissance Humanists; Machiavelli; More; Reformation; Luther; Calvin; Natural Law; Grotius; Divine Right; Common Law; Bacon; English Revolutionaries; Hobbes; Locke; Astell; Enlightenment; Rousseau; French Revolutionaries; Hume; Burke; Wollstonecraft.

Pol 5253. Modernity and its Discontents: Late Modern Political Thought. (4 cr. §3253)
Theoretical responses to and rival interpretations of Western economy, society, politics, and democratic culture in the modern age; theories of history; class struggle; end of metaphysics and death of God; technology and bureaucracy; psychology of culture in Hegel, Marx, Tocqueville, Mill, Nietzsche, Weber, Freud.

Pol 5970. Individual Reading and Research. (1-4 cr [max 1 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study.

Portuguese (Port)

Department of Spanish and Portuguese Studies
College of Liberal Arts

Port 1101. Beginning Portuguese. (5 cr)
Speaking and understanding Portuguese; pronunciation; introduction to writing and reading; basic grammar; cultural aspects of language and civilizations of Portuguese-speaking world.

Port 1102. Beginning Portuguese. (5 cr. Prereq–1101 or #)
Speaking and understanding Portuguese; pronunciation; introduction to writing and reading; basic grammar; cultural aspects of language and civilizations of Portuguese-speaking world.

Port 1103. Intermediate Portuguese. (5 cr. Prereq–1102 or #)
Speaking and comprehension. Development of reading and writing skills based on Portuguese-language materials.

Port 1104. Intermediate Portuguese. (5 cr. Prereq–1103 or #)
Speaking and comprehension. Development of reading and writing skills based on materials from Portugal and Brazil. Grammar review; compositions and short presentations.

Port 3001. Portuguese for Spanish Speakers. (4 cr. Prereq–[Span 3015, GPT] or # [for speakers of other Romance languages])
Based on student's knowledge of Spanish. Contrastive approach to Portuguese phonic/morpho-syntactic structures.

Port 3003. Portuguese Conversation and Composition. (4 cr. Prereq–[1104, GPT] or 3001)
Speaking, writing. Cultural comparisons, current events. Grammar review. Writing workshops.

Port 3501V. Honors: Foundations of Lusophone Cultures. (3 cr; A-F only. Prereq–[3003 or Span 3003], honors)
Foundations of Portuguese-speaking cultures (Portugal, Brazil, Lusophone Africa) from origins to present. Social/cultural trends that are basis for modern Portuguese-speaking world (literature, history, cinema, music).

Port 3501W. Foundations of Portuguese Cultures. (3 cr. Prereq–3003)
Foundations of Portuguese-speaking cultures (Portugal, Brazil, Lusophone Africa) from origins to present. Social/cultural trends that form basis for modern Portuguese-speaking world (literature, history, cinema, music).

Port 3502V. Honors: Foundations of Brazilian Culture. (3 cr; A-F only. Prereq–[3003 or equiv], honors)
Emphasizes modern Brazilian society. History, culture (e.g., music, art, cinema, literature, intellectual thought, popular culture, media), social problems (e.g., ethnicity, tropical deforestation).

Port 3502W. Foundations of Brazilian Culture. (3 cr. Prereq–3003 or equiv)
Emphasis on modern Brazilian society. History, culture (music, art, cinema, literature, intellectual thought, popular culture, media), and social problems (ethnicity, tropical deforestation).

Port 3503V. Honors: Literatures and Cultures of Lusophone Africa. (3 cr; A-F only. Prereq–3003)
Origins/development of Lusophone Africa (Angola, Cape-Verde, Guinea-Bissau, Mozambique, Sao Tome, Principe) using literature, cultural/literary criticism, history, anthropology, and various media (e.g., film, art, music, Internet).

Port 3503W. Literatures and Cultures of Lusophone Africa. (3 cr. Prereq–3003)
Origins/development of Lusophone Africa (Angola, Cape-Verde, Guinea-Bissau, Mozambique, Sao Tome/Principe) using literature, cultural/literary criticism, history, anthropology, and various media (film, art, music, Internet).

Port 3603. Portuguese-Speaking Cultures and Literatures in Translation. (3 cr)
Introduction to the Portuguese-speaking world using literature, history, anthropology, and film. Focuses on sociopolitical, cultural, and historical development of Brazil, Portugal, and Lusophone Africa (Angola, Mozambique, Cape-Verde, Guinea-Bissau, and São Tomé and Príncipe).

Port 3800. Film Studies in Portuguese. (3 cr [max 6 cr]; A-F only. Prereq–3003 or [Δ, #])
Films from Portuguese-speaking world in their historical, (geo)political, and socio-economic contexts. Films from Brazil, Portugal, or Lusophone Africa analyzed under interdisciplinary framework, noting aspects related to cinematography/rhetorics.

Port 3800H. Honors: Film Studies in Portuguese. (3 cr [max 6 cr]; A-F only)
Films from Portuguese-speaking world in their historical, (geo)political, and socio-economic contexts. Films from Brazil, Portugal, or Lusophone Africa analyzed under interdisciplinary framework, noting aspects related to cinematography/rhetorics.

Port 3830. Film Studies in Portuguese. (3 cr; A-F only. Prereq–Port 3003 or [Δ, #])
Films from the Portuguese-speaking world in their historical, (geo)political, and socioeconomic contexts. Films from Brazil, Portugal, or Lusophone Africa analyzed under interdisciplinary framework, noting aspects related to cinematography/rhetorics.

Port 3830H. Honors: Film Studies in Portuguese. (3 cr; A-F only. Prereq–3003 or [Δ, #])
Films from Portuguese-speaking world in their historical, (geo)political, and socio-economic contexts. Films from Brazil, Portugal, or Lusophone Africa analyzed under interdisciplinary framework, noting aspects related to cinematography/rhetorics.

Port 3910. Topics in Lusophone Literatures. (3 cr [max 9 cr]. §3310, §3910H)
Critical reading of Lusophone literary texts (Brazil, Portugal, Portuguese-speaking Africa) representing various genres (novel, short story, poetry). Terminology of criticism, literary problems, techniques.

Port 3910H. Honors: Topics in Lusophone Literatures. (3 cr [max 9 cr]; A-F only. §3310, §3910. Prereq–3003, honors)
Lusophone literary texts (from Brazil, Portugal, Portuguese-speaking Africa) representing various genres (e.g., novel, short story, poetry). Terminology of criticism, literary problems, techniques.

Port 3970. Directed Readings. (1-4 cr [max 9 cr]. Prereq–3501 or 3502 or 3503 or 3910)
Guided individual reading or study

Port 5520. Portuguese Literary and Cultural Studies. (3 cr [max 9 cr]. Prereq–#)
Study of origins and development of modern Portuguese nation (late 15th to 20th century) using literature, cultural and literary criticism, history, sociology) and various media (film, art, music, Internet). Main cultural problematics pertaining to Portugal as well as fundamental literary texts.

Port 5530. Brazilian Literary and Cultural Studies. (3 cr [max 9 cr]. Prereq–#)
Study of origins and development of modern Brazilian nation (late 16th to 20th century) using literature, cultural and literary criticism, history, sociology) and various media (film, art, music, Internet). Main cultural problematics pertaining to Brazil as well as fundamental literary texts.

Port 5540. Literatures and Cultures of Lusophone Africa. (3 cr [max 9 cr]. Prereq–#)
Origins/development of Lusophone Africa (Angola, Mozambique, Cape-Verde, Guinea-Bissau, São Tomé, Príncipe) using literature, cultural/literary criticism, history, sociology, and various media (film, art, music, Internet).

Port 5910. Topics in Lusophone Cultures. (3 cr [max 9 cr]. Prereq–#)
Cultural manifestations in Portuguese-speaking world (Portugal, Brazil, Lusophone Africa): literature, history, film, intellectual thought, critical

theory, popular culture. Topics include: Portuguese colonialism; postcolonial nation in Lusophone world; Lusophone women writers; Luso-Brazilian (post)modernity.

Port 5920. Figures in Lusophone Literatures. (3 cr [max 9 cr]. Prereq–#)
One Portuguese, Brazilian, or other major Portuguese-speaking writer or group of writers whose work has had impact on thought, literature, or social problems (e.g., Machado de Assis, Fernando Pessoa, Clarice Lispector). Figures specified in *Class Schedule*.

Port 5930. Topics in Brazilian Literature. (3 cr [max 9 cr]. Prereq–#)
Major issues of Brazilian literature; focuses on important authors, movements, currents, genres. Problems, socioeconomic questions, literary techniques related to Brazilian themes. Topics specified in *Class Schedule*.

Port 5970. Directed Readings. (3 cr [max 9 cr]. Prereq–MA or PhD candidate, #, Δ, ❑)
Lusophone studies (Portuguese-speaking Africa, Brazil, Portugal). Areas not covered in other courses. Students submit reading plans for particular topics, figures, periods, or issues.

Port 5990. Directed Research. (1-4 cr [max 9 cr]. Prereq–#, Δ, ❑)
Graduate-level research in literatures and cultures of the Portuguese-speaking world. Topics vary.

Pre-Major Advising (PMA)

College of Liberal Arts Student Services

College of Liberal Arts

PMA 1005. Orientation to the Health Sciences. (2 cr. Prereq–[1st or 2d yr] student)
Academic/professional options. Discussion, textbook readings, experimental activities, self-assessment exercises, presentations by health care professionals.

PMA 3008. Orientation to Medicine. (1 cr; S-N only)
Sociological issues related to the discipline of medicine and insights into medicine as a career and educational experience. Overview of medicine including a variety of guest lecturers from the community and the University.

Program for Individualized Learning (PIL)

College of Continuing Education

PIL 3200. Continuing Studies. (1 cr; S-N only. Prereq–PIL student, Δ)
Students complete work for another PIL course in which an incomplete was received. Registration allows students to access academic advising in PIL.

PIL 3211. Degree Planning. (8 cr; S-N only. Prereq–PIL student, Δ)
Students develop individualized curricular plans for their baccalaureate degrees.

PIL 3212. Degree Planning. (4 cr; S-N only. Prereq–PIL student, Δ)
Continuation or additional registration for degree planning.

PIL 3251. Individualized Study. (4 cr; S-N only. Prereq–PIL student, Δ)
Students develop a project proposal, identify objectives/resources, conduct research, accomplish an outcome, secure a narrative evaluation from a project adviser/evaluator.

PIL 3281. Major Project. (8 cr; S-N only. Prereq–PIL student, Δ)
Students complete a major project as partial fulfillment of criterion for Primary Area Studies in their degree plans.

PIL 3282. Major Project. (4 cr; S-N only. Prereq–PIL student, Δ)
Additional registration for students who need to complete their major projects.

PIL 3283. Major Project. (4 cr; S-N only. Prereq–PIL student, Δ)
Additional registration for students completing their major projects.

PIL 3291. Graduation Preparation. (8 cr; S-N only. Prereq–PIL student, Δ)
Students compile a graduation dossier for presentation to preliminary review committee. Dossier consists of criteria summary, introduction, transcripts, illustrative materials, project proposals, degree plan.

PIL 3292. Graduation Preparation. (4 cr; S-N only. Prereq–PIL student, Δ)
Students complete draft dossier.

PIL 4299. Graduation Review. (4 cr; S-N only. Prereq–PIL student, Δ)
Students revise graduation dossier, present it to graduation review committee for BA or BS degree recommendation.

Psychology (Psy)

Department of Psychology

College of Liberal Arts

Psy 1001. Introduction to Psychology. (4 cr. §GC 1281)
Scientific study of human behavior. Problems, methods, findings of modern psychology.

Psy 1905. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in *Class Schedule*.

Psy 3005W. Introduction to Research Methods and Statistics. (4 cr; A-F only. Prereq–1001)
Concepts/procedures used to conduct/evaluate research, especially in social sciences. Benefits/limitations of traditional research methods. Using statistics to describe/interpret research outcomes. Evaluating scientific claims.

Psy 3011. Introduction to Learning and Behavior. (3 cr. Prereq–1001)
Basic methods and findings of research on learning and behavior change. Survey of 20th-century theoretical perspectives, including contemporary models. Emphasis on animal learning and behavioral psychology.

Psy 3031. Introduction to Sensation and Perception. (3 cr. Prereq–1001)
Psychological, biological, and physical bases of sensory experience in humans and animals. Emphasis on the senses of vision and hearing.

Psy 3051. Introduction to Cognitive Psychology. (3 cr. Prereq–1001)
Scientific study of the mind in terms of representation and processing of information. Research and theory on cognitive abilities such as perception, attention, memory, language, and reasoning. Aspects of computational modeling and neural systems.

Psy 3061. Introduction to Biological Psychology. (3 cr. §5061. Prereq–1001 or Biol 1009)
Basic neurophysiology/neuroanatomy, neural mechanisms of motivation, emotion, sleep-wakefulness cycle, learning/memory in animals/humans. Neural basis of abnormal behavior, drug abuse.

Psy 3101. Introduction to Personality. (3 cr. §5101. Prereq–1001)
Major theories, issues, facts about personality and personality assessment. Review of important historical/contemporary perspectives (e.g., psychoanalysis, humanistic psychology, trait psychology, behaviorism, evolutionary psychology) on human nature/individuality.

Psy 3135. Introduction to Individual Differences. (3 cr. §5135. Prereq–3005W)
Differential methods in studying human behavior. Overview of psychological traits. Influence of age, sex, heredity, and environment in individual/group differences in ability, personality, interests, and social attitudes.

Psy 3137. Readings in Behavioral Genetics. (1 cr. Prereq–¶5137)
This course may be taken as an optional supplement to lecture course in behavioral genetics (5137). Each week students will read one or two articles relevant to topics covered in the lecture and discuss the articles with the instructor during a one hour contact session. Readings will not overlap those assigned in the lecture class.

Psy 3201. Introduction to Social Psychology. (4 cr. Prereq–1001 or #)
Overview of theories/research in social psychology. Emphasizes attitudes/persuasion, social judgment, the self, social influence, aggression, prejudice, helping, and applications.

Psy 3301. Introduction to Cultural Psychology. (3 cr; A-F only. Prereq–[1001, 3005W] or #)
Theories/research on how culture influences basic psychological processes (e.g., emotion, cognition, psychopathology) in domains that span different areas of psychology (e.g., social, clinical, developmental, industrial-organizational) and of other disciplines (e.g., anthropology, public health, sociology).

Psy 3604. Introduction to Abnormal Psychology. (3 cr. §5604H. Prereq–1001)
Diagnosis, classification, etiologies of behavioral disorders.

Psy 3617. Introduction to Clinical Psychology. (3 cr. Prereq–3604 or 5604H)
Historical developments, contemporary issues. Trends in psychological assessment methods, intervention strategies, and clinical psychology research. Theories behind, empirical evidence for, usefulness of psychological intervention strategies.

Psy 3666. Human Sexuality. (3 cr. Prereq–1001)
Overview of theories, research, and contemporary issues in human sexual behavior from an interdisciplinary perspective. Topics include sexual anatomy and physiology, hormones and sexual differentiation, cross-cultural perspectives on sexual development, social and health issues, and sexual dysfunction and therapy.

Psy 3711. Introduction to Industrial and Organizational Psychology. (3 cr. Prereq–[1000, [3005W or 4801 or equiv]] or #)
Application of psychological theory and research to recruitment, personnel selection, training and development, job design, work group design, work motivation, leadership, performance assessment, and job satisfaction measurement.

Psy 3902W. Major Project in Psychology. (4 cr; A-F only. Prereq–3005W, [jr psychology major or sr psychology major])
Seminar for completing undergraduate major project paper.

Psy 3960. Undergraduate Seminar. (1-5 cr [max 45 cr]. Prereq–1001)
Current topics in psychology. Topics listed in psychology office.

Psy 3993. Directed Study. (1-6 cr [max 24 cr]. Prereq–#, Δ, ❑)
Independent reading leading to paper or to oral or written exam.

Psy 3994. Directed Research. (1-6 cr [max 24 cr]. Prereq–#, Δ, ❑)
Individual empirical project leading to written report.

Psy 3996. Undergraduate Field Study/Internship in Psychology. (1-6 cr [max 12 cr]. Prereq–1001, #, Δ, ❑)
Supervised field work/internship experiences in community or industry pertinent to formal academic training in psychology.

Psy 4011. Applied Behavioral Psychology. (3 cr. Prereq–3011 or #)
Fundamental concepts of behavioral psychology. Practical techniques of behavior modification with humans/animals. Emphasizes functional analyses of behavior deficits/excesses, development/implementation of programs to bring about meaningful behavior change.

Psy 4036. Perceptual Issues in Visual Impairment. (3 cr. Prereq–1001 or #)
Contemporary knowledge on visual, tactile, and auditory perception informs us about the challenges and capabilities of people who are blind or have low vision. Topics include reading, space perception, mobility, and the strengths and weaknesses of pertinent adaptive technology.

Psy 4133. Psychological Testing and Assessment. (3 cr. Prereq–3005W)
Survey of psychological tests, assessment instruments. Methods for developing, administering, scoring tests. Criteria for evaluating test/assessment adequacy. Examples relevant to clinical psychology (e.g., abilities, personality, mental disorders). Hands-on opportunity to design/evaluate a psychological test. Small groups.

Psy 4501. Psychology of Women. (3 cr. Prereq–1001 or #)
Survey of current theory and research regarding psychology of women and psychological sex differences including topics related uniquely to women (e.g., pregnancy) as well as sex differences in personality, abilities, and behavior.

Psy 4801. Introduction to Statistics. (3 cr. Prereq–3005W or #)
Descriptive/inferential statistics, hypothesis testing, correlation, regression.

Psy 4902V. Honors Project. (1-6 cr [max 5 cr]; A-F only. Prereq–Honors, #, Δ)
Critical literature review or empirical study.

Psy 4993. Directed Study: Special Areas of Psychology and Related Sciences. (1-6 cr [max 16 cr]. Prereq–#, Δ)

Psy 4994V. Honors Research Practicum. (4 cr. Prereq–3005W, honors psych)
Practical experience conducting psychological research. Preparation for completion of honors thesis. Research ethics, practical aspects of conducting psychological research, writing research reports. Students assist faculty and advanced graduate students in research.

Psy 4996H. Honors Internship/Externship. (1-6 cr; A-F only. Prereq–Honors, #, Δ, ❑)
Supervised internship/externship experience in a community-service or industrial setting relevant to formal academic training/objectives.

Psy 5012. Psychology of Conditioning and Learning. (4 cr. Prereq–3011 or grad student or #)
Review/evaluation of key questions, methods, theories, and data about classical conditioning, instrumental learning, and elementary cognitive processes. Emphasizes animal models.

Psy 5014. Psychology of Human Learning and Memory. (3 cr. Prereq–3011 or 3051, except honors, grads)
Survey of basic methods and findings of research on human learning, memory, and cognition. Emphasis on major factors influencing human encoding or acquisition of information and skill, retention, and retrieval. Theoretical perspectives on underlying processes of encoding, retention, and retrieval.

Psy 5015. Cognition, Computation, and Brain. (3 cr. Prereq–3051 [except for honors/graduate students])
Human cognitive abilities (perception, memory, attention) from different perspectives (e.g., cognitive psychological approach, cognitive neuroscience approach).

Psy 5031W. Perception. (3 cr. Prereq–3031 or 3051 or #)
Cognitive, computational, and neuroscience perspectives on visual perception. Topics include color vision, pattern vision, image formation in the eye, object recognition, reading, and impaired vision.

Psy 5034. Psychobiology of Vision. (3 cr. Prereq–3031 or #)
Analysis of the properties and biological bases of visual perception in humans and animals. Emphasis on color vision, visual sensitivity and adaptation, nerve cells and circuits in the eye, structure and function of the visual brain.

Psy 5036W. Computational Vision. (3 cr. Prereq–[[3031 or 3051], Math 1272] or #)
Applications of psychology, neuroscience, computer science to design principles underlying visual perception, visual cognition, action. Compares biological/physical processing of images with respect to image formation, perceptual organization, object perception, recognition, navigation, motor control.

Psy 5037. Psychology of Hearing. (3 cr. Prereq–3031 or #)
Biological and physical aspects of hearing, auditory psychophysics, theories and models of hearing, perception of complex sounds including music and speech, clinical, and other applications.

Psy 5038W. Introduction to Neural Networks. (3 cr. Prereq–[[3061 or NSc 3102], Math 2243] or #)
Parallel distributed processing models in neural/cognitive science. Linear models, Hebbian rules, self-organization, non-linear networks, optimization, representation of information. Applications to sensory processing, perception, learning, memory.

Psy 5051W. Psychology of Human-Machine Interaction. (3 cr. Prereq–3031 or 3051 or #)
Psychological perspectives on human-machine interaction and factors that limit performance. Cognitive and perceptual aspects of computer, use, telepresence, and design and evaluation of sensory aids.

Psy 5054. Psychology of Language. (3 cr. Prereq–3005W or honors or grad student or #)
Theories/experimental evidence in past/present conceptions of psychology of language.

Psy 5061. Neurobiology of Behavior. (3 cr. §3061. Prereq–3005W or Biol 1009 or #)
Physiological/neuroanatomical mechanisms underlying behavior of animals, including humans. Neural basis of learning/memory, sleep, wakefulness, and attention processes. Effects of drugs on behavior.

Psy 5062. Cognitive Neuropsychology. (3 cr. Prereq–3031 or 3051)
Consequences of different types of brain damage on human perception/cognition. Neural mechanisms of normal perceptual/cognitive functions. Vision/attention disorders, split brain, language deficits, memory disorders, central planning deficits. Emphasizes function/phenomenology. Minimal amount of brain anatomy.

Psy 5064. Brain and Emotion. (3 cr; A-F only. Prereq–3061 or 5061 or #)
Introduction to affective neuroscience. Focuses on how brain promotes emotional behavior in animals/humans. Biological theories of emotion reviewed in historical, current theoretical contexts. Research related to specific "basic" emotions, including brain substrates for fear, sadness, pleasure, attachment. Implications for understanding emotional development, vulnerability to psychiatric disorders.

Psy 5101. Personality Psychology. (3 cr. §3101. Prereq–3005W, [honors or grad student])
Theories and major issues/findings on personality functioning, personality structure, and personality assessment. Historically important and currently influential perspectives.

Psy 5135. Psychology of Individual Differences. (3 cr. §3135. Prereq–[[3005W or equiv], 5862] or #)
Differential methods in study of human behavior. Overview of nature of psychological traits. Influence of age, sex, heredity, and environment in individual/group differences in ability, personality, interests, and social attitudes.

Psy 5137. Introduction to Behavioral Genetics. (3 cr. Prereq–3005W or equiv or #)
Genetic methods for studying human/animal behavior. Emphasizes nature/origin of individual differences in behavior. Twin and adoption methods. Cytogenetics, molecular genetics, linkage/association studies.

Psy 5138. Psychology of Aging. (3 cr. Prereq–3005W or equiv)
Theories/findings concerning age-related changes in mental health, personality, cognitive functioning, productivity are reviewed/interpreted within context of multiple biological, social, and psychological changes that accompany age.

Psy 5202. Attitudes and Social Behavior. (3 cr. Prereq–3201 or #)
Theory/research in social psychology, other fields in psychology of attitudes, beliefs, values. These fields' relationship to social behavior. Principles/theories of persuasion.

Psy 5204. Psychology of Interpersonal Relationships. (3 cr; A-F only. Prereq–3201 or #)
Introduction to interpersonal relationship theory and research findings, with emphasis on conceptual and methodological issues in relationship research.

Psy 5205. Applied Social Psychology. (3 cr. Prereq–3201 or grad student or #)
Applications of social psychology research/theory to domains such as physical/mental health, education, the media, desegregation, the legal system, energy conservation, public policy.

Psy 5206. Social Psychology and Health Behavior. (3 cr; A-F only. Prereq–3201 or grad student or #)
Survey of social psychological theory/research pertaining to processes by which people develop beliefs about health/illness. Relationship between these beliefs, adoption of health-relevant behavior. Effect of psychological factors on physical health.

Psy 5207. Personality and Social Behavior. (3 cr; A-F only. Prereq–3101 or 3201 or honors or grad student or #)
Conceptual/methodological strategies for scientific study of individuals and their social worlds. Applications of theory/research to issues of self, identity, and social interaction.

Psy 5501. Vocational and Occupational Health Psychology. (3 cr. Prereq–3005 or #)
Survey of history, concepts, theories, methods, and findings of vocational/occupational health psychology. Burnout, personality, violence, stressors/stress-relations, counter productive behaviors, coping in workplace. Vocational development/assessment, career decision-making/counseling, person-environment fit.

Psy 5604H. Abnormal Psychology. (3 cr. §3604. Prereq–Honors or grad student or #)
Comprehensive review of psychopathological disorders. Etiology, diagnostic criteria, clinical research findings.

Psy 5701. Organizational Staffing and Decision Making. (3 cr. Prereq–[[3005W or 4801 or equiv], 3711] or #)
Application of psychological research/theory to issues in personnel recruitment/selection and to measurement of job performance. Applying principles of individual differences, psychological measurement to decision making in organizations (recruitment, selection, performance appraisal).

Psy 5702. Psychological Foundations of Individual Behavior in Organizations. (3 cr. Prereq–[[3005W or 4801 or equiv], 3711] or #)
Theory/research on human behavior/performance in organizations. Organizational socialization processes across career span, leadership styles/processes, work team structures/characteristics. Problem-solving, decision-making processes. Group dynamics, inter-group relations.

Psy 5705. Psychology of Work Motivation. (3 cr. Prereq–4801 or equiv, 3711 or #)
Motivation issues related to the behavior and performance of individuals in organizational settings. Contemporary work motivation theories and practices that relate person factors and environmental factors to skill acquisition, job performance, organizational citizenship behavior, and job satisfaction.

Psy 5707. Personnel Psychology. (4 cr. §5701, §5703. Prereq–[[3005W or equiv], 3711] or #)
Application of psychological research/theory to organizational staffing, evaluation, and training. Principles of individual differences and

psychological measurement applied to decision making, staffing, and instruction in organizations. Job analysis, recruitment, screening, selection, performance appraisals, criterion measurement, organizational training, learning, aptitude treatment interactions.

Psy 5708. Organizational Psychology. (4 cr. §5702, §5705. Prereq–[[3005W or equiv], 3711] or #)
Psychological causes of behavior in work organizations. Consequences for individual fulfillment and organizational effectiveness. Individual differences, social perception, motivation, stress, job design, leadership, job satisfaction, teamwork, organizational culture.

Psy 5862. Psychological Measurement: Theory and Methods. (3 cr. Prereq–4801 or equiv)
Types of measurements (tests, scales, inventories) and their construction. Theory/measurement of reliability/validity.

Psy 5865. Advanced Psychological and Educational Measurement. (4 cr. Prereq–5862 or #)
Topics in test theory. Classical reliability/validity theory/methods, generalizability theory. Linking, scaling, equating. Item response theory, methods for dichotomous/polytomous responses. Comparisons between classical, item response theory methods in instrument construction.

Psy 5960. Topics in Psychology. (1-4 cr [max 8 cr]. Prereq–1001, [jr or sr or grad student])
Special course or seminar. Topics listed in psychology office.

Public Affairs (PA)

Hubert H. Humphrey Institute of Public Affairs

PA 1490. Topics in Social Policy. (1-3 cr [max 9 cr])
Topics in social policy.

PA 1907W. Freshman Seminar: Cultural Diversity. (3 cr. §1906, §1908, §1909. Prereq–Fewer than 24 sem cr)
Reading, discussion, critical analysis, writing. Intensive, small-group setting.

PA 1961W. Personal Leadership in the University. (3 cr. Prereq–Fr or soph)
Introduction to leadership theory, personal development, interpersonal relations, leadership at University of Minnesota. Personal assessment, written/verbal presentation, resume writing, electronic communication, goal setting, coping with group dynamics.

PA 3311W. Introduction to Public Policy Analysis. (3 cr; A-F only. Prereq–ApEc 1101 or Econ 1101)
Elements of public policy analysis, policy analysts' roles, market failure, public choice, bureaucratic decision making, and public services.

PA 3401. The Arts of Liberty: Educating for Democracy in Information Age. (3 cr)
"Hands-on" approach to education for democracy. Core concepts and their different meanings in American history, especially ideas of freedom, work, and democracy. Students participate in community projects, either through the Jane Addams School or as "democratic coaches" for teams of young people. Two essays and a journal.

PA 3961W. Leadership, You, and Your Community. (3 cr. Prereq–[1961 or EdPA 1301], [undergrad leadership minor or jr or sr])
Leadership and leadership capacities. Multicultural/multidimensional perspectives. Students examine their views on leadership. Leadership theory/practice. Group dynamics/behavior. Applying knowledge to practice.

PA 3971. Leadership Minor Field Experience. (2 cr; A-F only. Prereq–[3961 or EdPA 3302], undergrad leadership minor)
Core leadership course information applied to leadership situations. Settings include community or educational organizations, corporations, University student organizations, and formal internships. Students identify two leadership objectives from among personal, interpersonal, and organizational development. Experiential learning, individual presentations, group discussions, critical reflection/writing.

PA 3990. General Topics in Public Policy. (1-3 cr [max 9 cr])
General topics in public policy.

PA 4190. Topics in Public and Nonprofit Leadership and Management. (3 cr [max 9 cr])
Topics in public/nonprofit leadership/management.

PA 4200. Urban and Regional Planning. (3 cr)
Fundamental principles of urban/regional land-use planning. Introduction to planning theory and its applications. Political-economic context of urban/regional planning.

PA 4290. Topics in Planning. (1-3 cr [max 12 cr])
Topics in social policy.

PA 4421. Racial Inequality and Public Policy. (3 cr)
Historical roots of racial inequality in American society. Contemporary economic consequences. Public policy responses to racial inequality. Emphasizes thinking/analysis that is critical of strategies offered for reducing racism and racial economic inequality.

PA 4490. Topics in Social Policy. (1-3 cr [max 9 cr])
Topics in social policy.

PA 4961W. Self-Developed Leadership in the World. (3 cr; A-F only. Prereq–[3961 or EdPA 3302], [3971 or EdPA 3402], undergrad leadership minor)
Leadership theory, community building/social change, systems thinking. Students conduct/present research on leadership models through literature review, internships, and study groups. Student groups produce major paper describing research project. Students assemble portfolio, participate in two-day leadership retreat.

PA 5001. Intellectual Foundations of Public Action. (1.5 cr; A-F only. Prereq–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Evolution of intellectual approaches that underlie public planning, management, and policy analysis as strategies for public action. How public decision making is shaped by knowledge and values; role of rationality. Conceptual approaches to public action along descriptive/normative lines and structure/process lines.

PA 5002. Introduction to Policy Analysis. (1.5 cr; A-F only. Prereq–Major in publ aff or publ policy or sci, tech, and environ pol or urban and regional planning or publ hlth or #)
Process of public policy analysis from problem structuring to communication of findings. Commonly used analytical methods. Alternative models of analytical problem resolution.

PA 5003. Introduction to Financial Analysis and Management. (1.5 cr; A-F only. Prereq–Major in publ aff or publ policy or sci, tech, and environ pol or urban and regional planning or publ hlth or #)
Basic finance and accounting concepts and tools used in public and nonprofit organizations. Fund accounting, balance sheet and income statement analysis, cash flow analysis, and public sector and nonprofit sector budgeting processes. Lectures and discussions, as well as cases and examples from nonprofit and public sector organizations.

PA 5004. Introduction to Planning. (3 cr; A-F only. Prereq–Major in [publ aff or publ policy or [sci, tech, and environ policy] or [urban and regional planning] or publ hlth] or #)
History, institutional development of urban planning as a profession. Intellectual foundations, planning theory. Roles of urban planners in U.S./international settings. Scope, legitimacy, limitations of planning and of planning process. Issues in planning ethics and in planning in settings of diverse populations/stakeholders.

PA 5011. Public Management and Leadership. (3 cr; A-F only. Prereq–Major in [publ aff or publ policy or sci/tech/environ policy or urban/regional planning or publ hlth] or #)
Challenges facing higher-level managers in public/nonprofit organizations in a mixed economy and democratic republic. Distinctive features of public/nonprofit management, skills necessary for effective management, manager's role as creator of public value. Lectures, case discussions.

PA 5012. The Politics of Public Affairs. (3 cr; A-F only. Prereq–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Stages of policy making from agenda setting to implementation. Role and behavior of political institutions (courts, legislatures, executives, and bureaucracies) and citizens, social movements, and interest groups. Concepts of political philosophy. Theories of the state. Team taught interdisciplinary course with small discussion sections.

PA 5013. Law and Urban Land Use. (1.5 cr; A-F only. Prereq–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Role of law in regulating and shaping urban development, land use, environmental quality, and local and regional governmental services. Interface between public and private sector.

PA 5021. Economics for Policy Analysis and Planning I. (2-3 cr; A-F only. Prereq–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Introduction to a selection of tools useful for public policy: intermediate microeconomics, rudiments of macroeconomics, and central concepts of international trade.

PA 5022. Economics for Policy Analysis and Planning II. (2-3 cr; A-F only. Prereq–5021 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Application of economic reasoning to a variety of public policy issues that may vary by section. Includes cost-benefit analysis, nonmarket valuation, and tax analysis.

PA 5031. Empirical Analysis I. (2-3 cr; A-F only. Prereq–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Basic statistical tools for empirical analysis of public policy alternatives. Frequency distributions, descriptive statistics, elementary probability and probability distributions, statistical inference, estimation and hypothesis testing, cross-tabulation and chi-square distribution, analysis of variance, correlation, simple and multiple regression analysis.

PA 5032. Intermediate Regression Analysis. (1-1.5 cr; A-F only. Prereq–5031 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Bivariate and multivariate models of regression analysis and assumptions behind them. Problems using these models when such assumptions are not met.

PA 5033. Multivariate Techniques. (1-1.5 cr; A-F only. Prereq–5031 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Examines public affairs topics using maximum likelihood estimation approaches.

PA 5034. Community Analysis and Planning Techniques. (2 cr. Prereq–5031 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Data analysis techniques for practitioners in fields of planning, management, and policy analysis who work at community and regional levels. Population analysis and forecasting techniques relevant for small geographic areas. Techniques for regional and local economic analysis, such as shift-share analysis, economic base, and location quotient analysis.

PA 5035. Survey Research and Data Collection. (1.5 cr; A-F only. Prereq–5031 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #)
Introduction to survey research methods emphasizing applications to policy and applied research. Research design choices (e.g., descriptive, experimental, case studies), sampling, variable specification and measurement, conducting interviews, mailed questionnaires, qualitative techniques.

PA 5101. Management and Governance of Nonprofit Organizations. (1.5 cr. Prereq–Grad or #)
Draws on theories, concepts, and real world examples to explore critical managerial challenges. Governance systems, strategic management practices, effect of different funding environments, management of multiple constituencies. Different types of nonprofits using economic/behavioral approaches.

PA 5102. Organization Design and Change. (1.5 cr. Prereq–Grad or #)
Basic concepts related to organizational design decisions. Managerial challenges associated with organizational change in context of public sector agencies and nonprofit organizations. Major forces for change, kinds of change, management of change. Case-based analysis/discussion.

PA 5111. Financial Management in Public and Nonprofit Organizations. (3 cr. Prereq–[5003, grad] or #)
Design, installation, and use of accounting/control systems in public/nonprofit organizations. Public accounting standards/practices, financial administration/reporting, debt management, budgeting, contract/procurement management systems. Lecture, discussion, case analysis.

PA 5112. Public Budgeting. (4 cr. Prereq–Grad or #)
Budget processes in legislative/executive branches of federal, state, and local government. Program planning evaluation/administration. Techniques of budget/program analysis. Use of budget as policy/management tool. Analysis of fund flows within/among governments.

PA 5113. State and Local Public Finance. (3 cr. Prereq–Grad or #)
Theory/practice of financing. Providing public services at state/local level of government. Emphasizes integrating theory/practice, applying materials to specific policy areas, and documenting wide range of institutional arrangements across/within the 50 states.

PA 5115. State and Local Public Services and Finance. (3 cr; A-F only. Prereq–ApEc 3001 or equiv)
Organization, delivery, economic analysis, and finance of state and local public services and functions.

PA 5121. Intergovernmental Relations. (3 cr. Prereq–Grad or #)
Theory/practice of intergovernmental relations in the United States. Historical, political, and economic roots of contemporary institutions. Intergovernmental dimensions of specific policy areas: education, economic development, metropolitan affairs, social welfare, and other areas of student interest.

PA 5122. Law and Public Affairs. (3 cr. Prereq–Grad or #)
Overview of evolution of American legal system. Role of courts, legislatures, and political actors in changing law. How law is used to change public policy.

PA 5123. Financial and Development Strategies for Nonprofit and Public Organizations. (1.5 cr. Prereq–Grad or #)
Nonprofit/public sector financial/development strategies, political strategies used to obtain funding, philanthropy's historical role in public affairs. Guest speakers.

PA 5131. Conflict Management: Readings in Theory and Practice. (3 cr. Prereq–Grad or #)
Current theory. Review of conflict resolution strategies. Aspects of interpersonal, group, organizational, and systemic conflict.

PA 5132. Mediation Training. (3 cr. Prereq–Grad student or #)
Creating an arena for mediation. Skills/expectations needed to mediate disputes between individuals, among groups: balanced (peer or colleague), imbalanced (power differentials). Role playing, group debriefing, critique. Cases.

PA 5133. Conflict Management Proseminar. (1 cr. Prereq–Grad student or #)
Topics in conflict management research/practice. Theoretical implications, practical applications from the perspectives of participants. National/international issues.

PA 5134. Conflict Management Proseminar. (1 cr. Prereq–Grad student or #)
Topics in conflict management. Theoretical implications, practical applications from the perspectives of participants. National/international issues.

PA 5190. Topics in Public and Nonprofit Leadership and Management. (1-3 cr [max 9 cr]. Prereq–Grad student or #)
Selected topics.

PA 5201W. American Cities I: Population and Housing. (4 cr. Prereq–Grad or #)
Emergence of North American cities. Residential building cycles, density patterns. Metropolitan housing stocks, supply of housing services. Population/household types. Neighborhood-level patterns of housing use. Housing prices. Intraurban migration. Housing submarkets inside metro areas. Emphasizes linking theory, method, and case studies.

PA 5202W. American Cities II: Land Use, Transportation, and the Urban Economy. (4 cr. Prereq–Grad student or #)
Urban economy, its locational requirements. Central place theory. Transportation and urban land use, patterns/conflicts. Industrial/commercial land blight. Real estate redevelopment. Historic preservation. Emphasizes links between land use, transportation policy, economic development, and local fiscal issues. U.S.-Canadian contrasts.

PA 5203W. Geographical Perspectives on Planning. (4 cr. §Geog 3605, §Geog 5605. Prereq–Grad student or #)
Includes additional weekly seminar-style meeting and bibliography project on topic selected in consultation with instructor.

PA 5211. Introduction to Land Use Planning. (3 cr. Prereq–[[Course in spatial analysis or work experience demonstrating knowledge of field], grad student] or #)
Physical/spatial basis for community/regional development. Role of public sector in guiding private development processes. Issues in design of settlements. Applied case studies examine public regulatory frameworks.

PA 5212. Managing Urban Growth and Change. (3 cr. Prereq–Grad student or #)
Theory/practice of planning, promoting, and controlling economic growth/change in urban areas. Economic development tools available to state/local policymakers, historic context of their use in the United States. legal, social, and economic implementation constraints. Interactions among economic, social, and demographic trends.

PA 5221. Private Sector Development. (3 cr. Prereq–Grad student or #)
Roles of various participants in land development. Investment objectives, effects of regulation. Overview of development process from private/public perspective.

PA 5231. Transit Planning and Management. (3 cr. Prereq–Grad student or #)
Principles/techniques related to implementing transit systems. Historical perspective, characteristics of travel demand, demand management. Evaluating/benchmarking system performance. Transit-oriented development. Analyzing alternative transit modes. System design/finance. Case studies, field projects.

PA 5241. Environmental Planning. (3 cr. Prereq–Grad student or #)
Relationship between natural resources, ecology, and urban development; planning design principles in balancing these. Legal/regulatory context of environmental planning. Methods of environmental impact analysis.

PA 5251. Strategic Planning and Management. (1.5 cr. Prereq–Grad student or #)
Theory/practice of strategic planning/management for governments, public agencies, and nonprofit organizations. How to promote strategic thinking/acting by policy-making bodies and management teams. Determining what an organization should do, how it should do it, and why. Lectures, case discussions.

PA 5252. Strategy and Tactics in Project Planning and Management. (1.5 cr. Prereq–Grad student or #)
Planning, analysis, evaluation, and implementation of short-term plans/projects. Technical analyses, interactional elements of completing projects within budget/time constraints. Strategic/tactical choices in planning. Case examples.

PA 5253. Participatory Management and Public Involvement Strategies. (3 cr. Prereq–Grad student or #)
Survey of strategies, techniques, and tools for involving groups members, teams, organizations, and stakeholders (including public at large) in problem definition, policy/plan formulation, decision making, and implementation. Emphasizes public/nonprofit organizations, citizen involvement.

PA 5261. Housing Policy. (3 cr. Prereq–Grad student or #)
Institutional/environmental setting for housing policy in the United States. Competing views of solving housing problems through public intervention in the market. Federal/local public sector responses to housing problems.

PA 5290. Topics in Planning. (1-3 cr [max 9 cr]. Prereq–Grad student or #)
Selected topics.

PA 5301. Population Methods and Issues for the United States and Third World. (3 cr. Prereq–Grad student or #)
Basic demographic measures/methodology. Demographic transition, mortality, fertility. Diverse perspectives on nonmarital fertility, marriage, divorce, and cohabitation. Cultural differences in family structure, aging, migration, refugee movements, population policies. Discussion of readings on population growth and environment.

PA 5311. Program Evaluation. (3 cr. Prereq–Grad student or #)
Principal methods, primary applications of evaluation research as applied to policies/programs in health/human services, education, or the environment. Conducting evaluations. Becoming a critical consumer of studies.

PA 5390. Topics in Advanced Policy Analysis Methods. (1-4 cr [max 9 cr]. Prereq–Grad student or #)
Topics in advanced policy analysis methods.

PA 5401. Poverty, Inequality, and Public Policy. (3 cr. Prereq–Grad student or #)
Nature/extent of poverty/inequality in the United States, causes/consequences, impact of government programs/policies. Extent/causes of poverty/inequality in other developed/developing countries.

PA 5411. Child Welfare Policy. (3 cr. Prereq–Grad student or #)
Intersection of conceptual orientations of developmental psychology with policies that affect children/families. Demographic, historical, social trends that underlie assumptions driving policies directed at women/children. Projections of future policies.

PA 5412. Aging and Disability Policy. (3 cr. Prereq–Grad student or #)
Policy debates concerning populations that are aging or disabled. Students learn/practice analyses in context of important health, social, and economic policy debates. Readings on current theory/evidence.

PA 5421. Racial Inequality and Public Policy. (3 cr. Prereq–Grad student or #)
Historical roots of racial inequality in American society. Contemporary economic consequences. Public policy responses to racial inequality. Emphasizes thinking/analysis that is critical of strategies offered for reducing racism and racial economic inequality.

PA 5431. Public Policies on Work and Pay. (3 cr. Prereq–[[PA 5031 or equiv], grad student] or #)
Public policies affecting employment, hours of work, and institutions in labor markets. Public programs impacting wages, unemployment, training, collective bargaining, job security, and workplace governance. Policy implications of the changing nature of work.

PA 5441. Education Policy and the State Legislature. (3 cr. Prereq–Grad student or #)
How Minnesota legislature decides K-12 issues. Implications for higher education. How to increase one's influence in process. Discussions with persons who influence statewide educational policy. Presentations. Field trip to state legislature.

PA 5442. Policy Design for Education and Human Development. (3 cr. Prereq–Grad student or #)
Designing effective educational policies. Using interdisciplinary approaches to identify/understand core variables (economic, psychological, etc). Work on policy design.

PA 5490. Topics in Social Policy. (1-4 cr [max 9 cr]. Prereq–Grad student or #)
Selected topics.

PA 5501. Economic Development I. (2 cr. Prereq–Grad student or #)
Economic development theories/strategies at national/regional levels in developing countries and the United States. Redistributive and basic needs strategies, institutional approaches, dependency/Neo-Marxist approaches, gender and development, sustainable development, effects of globalization on workers/communities, public policy responses.

PA 5502. Economic Development II. (2 cr; A-F only. Prereq–[[5501 or equiv], grad student] or #)
Economic development from macroeconomic/open-economy perspective. Sources of economic growth. Agricultural development. Import-substitution industrialization. Endogenous growth models. Population, migration, and human development. Policy reform/adjustment.

PA 5511. Community Economic Development. (3 cr. Prereq–Grad student or #)
Contexts/motivations behind community economic development activities. Alternative strategies for organizing/initiating economic development projects. Tools/techniques for economic development analysis/planning (market analysis, feasibility studies, development plans). Implementation at local level.

PA 5521. Development Planning and Policy Analysis. (4 cr. Prereq–[[5031 or equiv], [5501 or equiv], grad student] or #)
Techniques/assumptions of development planning and policy analysis at national, regional, and project levels. Direct/indirect effects of external shocks and government interventions on national/regional economies. Macroeconomic modeling, input-output analysis, social accounting matrices/multipliers, project appraisal/evaluation techniques.

PA 5522. Economic Development Policies in Latin America. (3 cr. Prereq–[[5021 or equiv], [5502 or equiv], grad student] or #)
Evolution of economic development policies from import-substituting industrialization policies of 1950s/1960s through beginning of reform in 1970s, economic crisis of 1980s, and reform into 1990s. Emphasizes privatization, economic integration, exchange rate/trade, and domestic/adjustment policies.

PA 5531. Strategies for Sustainable Development: Theory and Practice. (1.5 cr. Prereq–[Microecon course, grad student] or #)
Economic, environmental, and social aspects of sustainable development. Strategies, methods of implementation, and applications of sustainable development in different economic systems of industrialized/developing countries. Special attention to countries in transition.

PA 5590. Topics in Economic and Community Development. (1-3 cr [max 9 cr]. Prereq–Grad student or #)
Selected topics.

PA 5601. Survey of Women, Law, and Public Policy in the United States. (3 cr. Prereq–Grad student or #)
Gendered nature of public policy. Historical analysis of welfare, single motherhood, and protective legislation. How laws structure public policy. How courts are arenas for policy making. Emphasizes employment discrimination and reproductive rights. Differences among women. Intersection of oppression based on class/race/sexual orientation.

PA 5611. Feminist Economics. (1.5 cr. Prereq–[5021, grad student] or #)
Feminist philosophy, methodology, and economic practice. Feminist perspectives on development and the global economy, work/family. Heterodox traditions in economics.

PA 5690. Topics in Women and Public Policy. (1-3 cr [max 9 cr]. Prereq–Grad student or #)
Selected topics.

PA 5701. Science and State. (3 cr. Prereq–Grad student or #)
Relationship between science and contemporary society. Nature of science: its values, processes, and ways of knowing. How science has influenced U.S. political institutions and political/judicial processes. Issues in current debate over U.S. science policy.

PA 5711. Science and Technology Policy. (3 cr. Prereq–Grad student or #)
Effect of science/technology on global economy, politics, environment, security. Role of national science/technology policies in development, diffusion, and adoption of technologies nationally/internationally. Issues related to technology, technology policy, technological development, impact of technology, international cooperation.

PA 5721. Energy and Environmental Policy. (3 cr. Prereq–Grad student or #)
Impact of energy production/consumption choices on environmental quality, sustainable development, and other economic/social goals. Emphasizes public policy choices for energy/environment, linkages between them.

PA 5722. Environmental and Resource Economics Policy. (3 cr. Prereq–[Intermediate microeconomics, intermediate policy analysis, grad student] or #)
Public policy associated with natural resource use and environmental protection. Develops/applies economic concepts/methodologies/policy mechanisms. Principles of environmental/resource economics. Issues related to renewable/nonrenewable resources and environmental pollution. Focuses on scientific/political aspects of policy.

PA 5790. Topics in Science, Technology, and Environmental Policy. (1-3 cr [max 9 cr]. Prereq–Grad or #)
Selected topics.

PA 5801. U.S. Foreign Policy: Process and Analysis. (3 cr. Prereq–Grad student or #)
U.S. general diplomacy, foreign economic policy. Emphasizes analysis. Broad security strategy. Policy towards specific geographic regions. Trade, investment, monetary policy. Immigration policy. Environmental cooperation.

PA 5811. Public Policy Problems of Globalization. (3 cr. Prereq–Grad student or #)
Policy problems facing national and subnational decision makers. Problems caused by increasing international mobility of goods, services, capital, persons, and ideas.

PA 5812. Open Economy Models: an Assessment. (3 cr. Prereq–[Intermediate macroeconomics, trade theory, grad student] or #)
Open economics, implications for policy making/implementation. Issues at level of international/domestic economies.

PA 5890. Topics in Foreign Policy and International Affairs. (1-5 cr [max 9 cr]. Prereq–Grad student or #)
Selected topics.

PA 5900. Computer Applications in Public Affairs (Summer). (.5 cr [max 6 cr]; S-N only. Prereq–#)
Introduction to basic computer systems/applications in public affairs practice (e.g., MS Windows, MS Word). Offered summer.

PA 5901. Computer Applications in Public Affairs. (.5-3 cr [max 6 cr]; S-N only. Prereq–#)
Introduction to computer systems/applications in public affairs practice.

PA 5902. Computer Applications in Public Affairs. (.5-3 cr [max 6 cr]; S-N only)
Introduction to computer systems/applications in public affairs practice.

PA 5903. Introduction to Computers and Applications at the Humphrey Institute. (2 cr; S-N only. Prereq–International HHH fellow)
Computers/applications. Basic skills. Software such as MS Word, Excel, PowerPoint, Access. Using Internet, e-mail, search engines (for research), HTML (through Web page creation software).

PA 5931. Role of the Media in Public Affairs. (3 cr. Prereq–Grad student or #)
Historical/contemporary role of news media in defining/shaping public opinion/policy, primarily in the United States. Emphasizes critical research, professional skills in three forms of journalism: hard news coverage, investigative reporting, documentaries. Field experience, practice in governmental public relations.

PA 5941. Leadership for the Common Good. (4 cr. Prereq–#)
Personal, team, organizational, visionary, political, and ethical aspects of leadership. Emphasizes building/experiencing a learning community.

PA 5951. Global Commons Seminar. (3 cr [max 6 cr]; S-N only. Prereq–International HHH fellow)
Meets specific needs of International Humphrey Fellows. Topics vary each year depending on the interests and needs of the fellows.

PA 5990. Topics: Public Affairs—General Topics. (1-3 cr [max 9 cr]. Prereq–Grad student or #)
General topics in public policy.

Public Health (PubH)

School of Public Health

PubH 1003. Alcohol and College Life. (1 cr. Prereq–Entering freshman)
Facts about how alcohol affects college life. Personal prevention strategies. Maximizing student/campus safety. Web-based distance learning format starts before students arrive on campus.

PubH 3001. Personal and Community Health. (2 cr. §3004)
Fundamental principles of health conservation and disease prevention.

PubH 3003. Fundamentals of Alcohol and Drug Abuse. (2 cr. §3004, §5003)
Scientific, sociocultural, and attitudinal aspects of alcohol and other drug abuse problems; emphasizes incidence, high-risk populations, prevention, and intervention.

PubH 3004. Basic Concepts in Personal and Community Health. (4 cr. §3001, §3003)
Scientific, sociocultural, and attitudinal aspects of communicable and degenerative diseases, environmental and occupational health hazards, and alcohol and drug problems. Role of education in health conservation, disease control, and drug abuse.

PubH 3010. Public Health Interventions for AIDS. (3 cr. Prereq–Undergrad)
Public health approaches to the AIDS epidemic. Epidemiological/clinical features of HIV infection. Impact of AIDS on certain communities/populations. Behavior change principles as they apply to AIDS interventions.

PubH 3040. Dying and Death in Contemporary Society: Implications for Intervention. (2 cr. Prereq–Health science major or social work major or education major or mortuary science major or #)
Basic background information on concepts, attitudes, ethics, and lifestyle management in relation to dying, death, grief, and bereavement. Emphasizes intervention/educational aspects of for community health and helping professionals and for educators.

PubH 3091. Practicum in Peer Education I. (2 cr; A-F only. Prereq–Upper div student with demonstrated hlth sci or hlth ed interests, 3001 or ¶3001 or 3004 or ¶3004, #)
Multiple factors that influence health. Through various health promotion strategies, students build upon or gain skills such as public speaking, needs assessments, program planning, interpersonal communication, and program evaluation.

PubH 3092. Practicum in Peer Education II. (2 cr; A-F only. Prereq–Upper div student with demonstrated hlth sci or hlth ed interests, 3001 or ¶3001 or 3004 or ¶3004, #)
Multiple factors that influence health. Through various health promotion strategies, students build upon or gain skills such as public speaking, needs assessments, program planning, interpersonal communication, and program evaluation.

PubH 3093. Directed Study: Public Health. (1-4 cr [max 4 cr]. Prereq–#)
Directed study in selected public health problems or current issues.

PubH 3201. Issues in Environmental and Occupational Health. (3 cr. §5201)
Scope of the field of environmental health. Concepts upon which environmental interventions are based. Consulting literature to identify appropriate interventions for community environmental health problems. Online course.

PubH 3301. Perspectives: Interrelationships of People and Animals in Society Today. (2 cr. §UC 4301, §CVM 6050)
Social, psychological, economic, and health consequences of people/animal relationships. Diversity of cultural perspectives on human/animal relationships. Animals and people sharing an urban environment. Hunting and wildlife conservation. Biomedical research. Animal rights and human/animal bond.

PubH 3310. Epidemiology: Science, Methodology, and Application. (2 cr. Prereq–Jr or sr or #)
Scientific work from perspective of epidemiology. Method of scientific inquiry. Methodology/problems of epidemiology.

PubH 3801. Health Economics and Policy. (3 cr. Prereq–[Principles of microeconomics [ApEc 1101 or Econ 1101], knowledge of plane geometry] or #)
Economics of health care markets. Problems faced by consumers and health care services. Builds on basic microeconomic principles of supply and demand for health, health care, health insurance, and role of government. Theoretical/empirical models/applications.

PubH 5003. Fundamentals of Alcohol and Drug Abuse. (1 cr. §3003, §3004. Prereq–Educ student or #)
Scientific/sociocultural aspects of alcohol/drug problems. Emphasizes role of education in health conservation and drug abuse prevention.

PubH 5005. Topics: Community Health Education. (1-4 cr [max 20 cr]. Prereq–#)
Topics of interest in community health education.

PubH 5010. Public Health Interventions for AIDS. (3 cr. Prereq–Upper div or grad student or professional school student or #)
Survey of public health approaches to AIDS epidemic. Epidemiological/clinical features of HIV infection. Impact of AIDS on certain communities/populations. Behavior change principles as they apply to AIDS interventions.

PubH 5017. Culture and Health Behavior. (2 cr. Prereq–Grad or professional school student or #)
Heightens cultural sensitivity regarding public health practice and individual health behaviors. Cultural diversity and its impact on health behaviors; etic (universal) and emic (culture-specific) approaches.

PubH 5020. Fundamentals of Social and Behavioral Science. (3 cr. Prereq–Public health or #)
Four major approaches to public health problems: psychosocial, economic, community, policy. Lectures provide overview of theory/implementation. Small groups provide opportunity to practice skills.

PubH 5030. Prevention of High-Risk Behavior Among Adolescents. (2 cr; A-F only. Prereq–[Grad-level behavioral sci course [5050 preferred], [CHE or MCH or PubH Nutr or Epi MPH or Epi grad]] or #; 2nd-yr master's student recommended)
Definitions/etiology of high-risk behaviors among adolescents. Intervention programs. Review of current literature. Students design prevention program overview based on theory/etiological data using health education/behavior change methods.

PubH 5034. Program Evaluation for Public Health Practice. (3 cr. Prereq–Che or MCH major or #)
Developing useful program evaluations. Emphasizes skills for program administrators, planners. Needs assessments, evaluability assessments, formative evaluation, implementation studies, outcome evaluations. Quantitative/qualitative data collection methods. Ethical considerations.

PubH 5035. Applied Research Methods. (3 cr. Prereq–[5414 or 5450 or equiv], [5034 or 5806 or equiv], [che or pub hlth nutr major or #]; 5420 recommended)
Complements master's project work using forms, questionnaires, interviews. Literature searching, questionnaire development, scale construction, item analysis, data coding, entry/analysis, report writing. Use of computer software package to develop questionnaire and analyze data.

PubH 5040. Dying and Death in Contemporary Society: Implications for Intervention. (2 cr. Prereq–Upper div or grad student or professional school student or #)
Concepts, attitudes, ethics, and lifestyle management related to dying, death, grief, and bereavement. Emphasizes intervention and educational aspects for community health and helping professionals and for educators.

PubH 5049. Legislative Advocacy Skills for Public Health. (3 cr; A-F only. Prereq–5398, #)
State legislature as arena for public health practice; develops skills necessary to operate in that arena. Analyzes emergence, development, and resolution of legislative issues of public health importance.

PubH 5050. Community Health Theory and Practice I. (3 cr. Prereq–Che major or #)
Socioenvironmental factors influencing health-related behavior. Role of groups, institutions, social structures in encouraging healthy, unhealthy behavior. Role of interventions affecting social environment; barriers to effective interventions. Individual behavior change theories, models targeting psychosocial approaches; application of theories in practice.

PubH 5051. Community Health Theory and Practice II. (3 cr. Prereq–Che major or #)
Conceptualizing, planning, and implementing community health education programs and interventions. Examines health education/promotion organizations; how organizational factors shape health education practice. Focuses on planning health education/promotion efforts. Students gain experience in developing a hypothetical community health intervention.

PubH 5055. Social Inequalities in Health. (2 cr. Prereq–Hlth sci professional school student or hlth sci or soc work or pub affairs grad student or #)
Extent/causes of social inequalities in health. Degree to which understanding of these inequalities is hampered by methodological limitations in health research. Focuses on individual, community, and policy approaches to reducing social inequalities in health.

PubH 5060. Smoking Intervention. (2 cr. Prereq–[CHE or MCH or EPI MPH] or EPI grad student or #)
Impact of smoking on U.S. public health. Review of research on onset/prevention. Factors maintaining dependence, cessation/intervention strategies. Public health campaigns. Public policies, second-hand smoking controversies. International issues.

PubH 5061. Community Health Education in Health Care Settings. (2 cr. Prereq–Public health student or #)
Scope/effectiveness of and barriers to health education in clinical settings. Role of public health professional in implementing/maintaining health education guidelines. Emphasizes health education for risk factor modification.

PubH 5074. Mass Communication and Public Health. (2 cr. Prereq–PubH MPH or grad student or Jour grad student or #; [background or coursework] in [social or behavioral] science recommended)
Role, functions, effects of mass media on public health. Planned/unplanned effects. Review of literature on how theories, models, assumptions of mass communication research relate to public's health.

PubH 5075. Obesity and Eating Disorders. (2 cr. Prereq–[Grad or prof school] student or #)
Definition, measurement, and prevalence. Social, behavioral, physiological causes. Health consequences. Treatment, prevention.

PubH 5078. Public Health Policy as a Prevention Strategy. (2 cr. Prereq–CHE or MCH or PubH Nutr or EPI MPH or EPI grad student or #)
Philosophical, ethical, economic, political, efficacy rationale for policy approach to prevention. Historical/current application of prevention policy to public health problems.

PubH 5080. Seminar: Policy, Politics, and Ethics of Public Health Decision Making. (2 cr; S-N only. Prereq–[2nd yr MPH or MS or PhD student in [CHE or EPI or MCH or PubH nutr or clin research] or public affairs or MS/JD or PhD/JD or 3rd yr law student], #)
Political/ethical factors that decision-makers must consider as public health policy is debated, adopted, and implemented. Role of public health professional in policy making. Focuses on current topics such as tobacco, privacy, genetics, and health care financing.

PubH 5091. Independent Study: Community Health Education. (1-4 cr [max 4 cr]. Prereq–CHE major, #)
Independent study supervised by a community health education faculty member.

PubH 5094. Master's Project: Community Health Education. (1-6 cr [max 6 cr]. Prereq–CHE major, #)
Directed research towards completion of master's project in community health education.

PubH 5096. Field Experience: Community Health Education. (1-6 cr [max 6 cr]; S-N only. Prereq–CHE major, #)
Supervised community health education field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems.

PubH 5100. Topics: Environmental and Occupational Health. (1-4 cr [max 20 cr]. Prereq–#)
New course offerings or topics of interest in environmental and occupational health.

PubH 5101. Master's Project: Environmental Health. (1-3 cr [max 5 cr]; S-N only. Prereq–EH major, #)
Directed research towards completion of the Master's Project in Environmental Health.

PubH 5102. Field Experience: Environmental Health. (1-5 cr [max 5 cr]; S-N only. Prereq–EH major, #)
Supervised environmental health field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems.

PubH 5103. Exposure to Environmental Hazards. (3 cr; A-F only. Prereq–EH major or #)
Nature, effects, regulation of exposure to biological, physical, chemical hazards in the environment, in context of inter-/multi-disciplinary scientific field of environmental health as essential component of public health.

PubH 5104. Environmental Health Effects: Introduction to Toxicology. (2 cr; A-F only)
Identifying mechanisms/effects on human health of environmental agents. Chemical, biological, physical, and psychological agents.

PubH 5105. Environmental and Occupational Health Policy. (3 cr; A-F only. Prereq–EH major or #)
Students develop an understanding of environmental and occupational health policies, laws, key concepts and principles, proposals and approaches for regulatory reform, approaches to policy analysis, and overall phases and issues in the policy-making process.

PubH 5110. Environmental and Worker Protection Law. (4 cr)
Law protecting public health and conserving the environment: 1) common law that evolved as courts settled private disputes; 2) public law made by legislatures and administrative agencies. Students research legal issues underlying public health and environmental policies, analyze court opinions, review statutes, and participate in negotiation exercise.

PubH 5111. Preventing Pollution: Innovative Approaches to Environmental Management. (3 cr. Prereq–Pub hlth or grad or honors undergrad student or #)
Interdisciplinary approach to pollution problems, including sustainability, pollution prevention, risk assessment, regulatory reform, and strategic environmental management.

PubH 5112. Risk Analysis: Application to Risk-Based Decision Making. (3 cr. Prereq–Pub hlth or grad student or #)
Introduction to risk in context of regulatory decision making.

PubH 5113. Public Policy and Risk: Strategies for Effective Decisions and Discourse. (3 cr. Prereq–Pub hlth or grad student or #)
Introduction to policy making in public health, environment characterized by substantial risk/uncertainty. Basic mathematics of decision making under risk/uncertainty. Cognitive psychology of how people react to risk. Methods of risk communication.

PubH 5120. Injury Prevention in the Workplace, Community, and Home. (2 cr)
Injury epidemiology: analyses of major injury problems affecting the public in the workplace, community, and home using epidemiologic model and conceptual framework; emphasis on strategies/program development for prevention and control.

PubH 5121. Topics: Injury Prevention in the Workplace, Community, and Home. (1-2 cr [max 2 cr]. Prereq–[5120 or 5194], 5320, #)
Selected projects.

PubH 5122. Seminar: Safety in the Workplace. (1 cr)
Realm of and potential risk factors for occupational safety problems; strategies for prevention and control.

PubH 5123. Violence Prevention and Control: Theory, Research, and Application. (2 cr)
Analysis/critique of major theories and of epidemiological research pertinent to violence, including characteristics of violence and relevant risk factors, reporting/treatment protocols, and current/potential intervention efforts and prevention initiatives. Emphasizes interdisciplinary contributions to violence prevention/control.

PubH 5130. Occupational Medicine: Principles and Practice. (3 cr. Prereq–EH major or #)
Pathogenesis of diseases caused by occupational hazards. Evaluating work-related illnesses. Overall regulatory framework governing occupational health and safety.

PubH 5140. Occupational and Environmental Epidemiology. (2 cr. Prereq–Basic course in [epi, biostats])
Principles/concepts in identifying health effects in workplace. Strategies for identifying excess risk, evaluating strengths/weaknesses of research techniques, assessing bias/confounding.

PubH 5150. Interdisciplinary Evaluation of Occupational Health and Safety Field Problems. (3 cr. Prereq–EH major or #)
Guided evaluation of potential health/safety problems at work site, recommendations and design criteria for correction/evaluation of occupational health/safety programs.

PubH 5160. Physiological Disposition of Xenobiotics. (3 cr. Prereq–1 course each in biochem, mol biol, org chem or #)
Pharmacokinetics/toxicokinetics and xenobiotic metabolism. Mechanisms by which phase I and phase II enzymes bioactivate and detoxify xenobiotics. Implications of these biochemical reactions for human health.

PubH 5161. Regulatory Toxicology. (2 cr; A-F only. Prereq–General environ toxicology course)
In-depth introduction to laws (and associated regulations) of U.S. federal regulatory agencies, such as CPSC, EPA, FDA, OSHA, and DOT, that require/use toxicological data/information in their mission of protecting human/environmental health.

PubH 5170. Introduction to Occupational Health and Safety. (3 cr. Prereq–Environmental health major or #)
Concepts/issues in occupational health/safety. Application of public health principles/decision-making process in preventing injury/disease, promoting health of adults, protecting worker populations from environmental hazards. Observational visit to manufacturing facility.

PubH 5171. Properties, Behavior, and Measurement of Airborne Contaminants. (3 cr; A-F only. Prereq–[EH major, [industrial hygiene specialty or equiv]] or #)
Airborne contaminants in outdoor/indoor environments. Emphasizes workplace environments. General physical properties of matter in gaseous/aerosol forms. Measurement/characterization of airborne concentrations of pollutants, human exposures to them. Setting of health-related environmental standards.

PubH 5172. Industrial Hygiene Applications. (2 cr. Prereq–[EH major, 5170] or #)
Recognition, evaluation, and control of occupational health/safety hazards. Practice application to specific industrial hygiene problems related to gases/vapors, aerosols, and physical agents.

PubH 5173. Hazard-Related Exposure to Physical Agents in the Environment. (3 cr. Prereq–EH major, [industrial hygiene specialty or equiv or #])
Nature, health effects, monitoring, and control of physical agents in working/living environments, ionizing/non-ionizing radiations (e.g., lasers/ultraviolet, visible, and infrared light), noise/vibration, heat/cold stress. Dose, response, and engineering interventions.

PubH 5174. Control of Exposure to Physical and Chemical Hazards. (3 cr. Prereq–[EH major, [industrial hygiene specialty or equiv]] or #)
Hierarchy of options for controlling human exposures to airborne contaminants, both gaseous and aerosol. Science/practice of process control and exhaust ventilation in workplaces and other indoor air spaces and in air cleaning. Control of emissions to ambient environment.

PubH 5175. Industrial Hygiene Measurements Laboratory. (2 cr. Prereq–5171 or #)
Broad treatment of occupational health field. Role of industrial hygienist. Emphasizes practical application of industrial hygiene concepts/methods. Lectures/demonstrations, lab exercises, project.

PubH 5176. Hazardous Materials and Waste Management. (3 cr. Prereq–5170, courses in chemistry [including organic or equiv])
Generation, control, disposal of hazardous materials/wastes. Recognizing, evaluating, controlling, preventing hazards from chemicals that threaten occupational/environmental health. Lectures, case studies, workshops, field trips.

PubH 5180. Environmental Microbiology. (4 cr. Prereq–MicB 3103 or equiv or #)
Survival, dissemination, significance, and monitoring of microbes in human environment. Principles of biological safety, including risk assessment, lab design/operation, lab animals, shipping/transport, sterilization, disinfection, and decontamination.

PubH 5190. Environmental Chemistry. (3 cr. Prereq–1 course each in gen chem, org chem or #)
Overview air, water, and soil chemistry; pertinent environmental problems; human and ecological multimedia exposures to chemicals in the environment.

PubH 5193. Directed Study: Environmental and Occupational Health. (1-4 cr [max 20 cr]; S-N only. Prereq–#)
Directed study in a topic agreed upon by student and faculty member.

PubH 5200. Environmental Health. (2 cr)
Principles of environmental health relating to macro- and micro-environments and to products consumed or used by people.

PubH 5201. Issues in Environmental and Occupational Health. (2 cr. Prereq–Pub hlth student or #)
The field, current issues, principles/methods of environmental/occupational health practice.

PubH 5290. Topics: Public Health Practice. (1-4 cr [max 20 cr])
New course offerings or topics of interest in public health practice.

PubH 5294. Master's Project: Public Health Practice. (1-3 cr [max 3 cr]; S-N only. Prereq–[PHP or PHPE] major, #)
Directed field research. Original or secondary analysis of data sets related to public health practice.

PubH 5296. Field Experience: Public Health Practice. (1-3 cr [max 3 cr]; S-N only. Prereq–[PHP or PHPE] major, #)
Directed field experience or clinical rotation/practicum in selected community or public health agencies/institutions. Integration of knowledge/skills in population science for public health.

PubH 5299. Public Health Practice: Introductory Seminar for Health and Human Resources Professionals. (1 cr [max 3 cr]; S-N only. Prereq–Baccalaureate degree or degree from a health professional program or grad student in [dentistry or medicine or nursing or pharmacy or public health or veterinary medicine])
Science/art of public health. Emphasizes interdisciplinary linkages to practice communities. National/local priorities as outlined in "Healthy People 2010" serve as framework for presentations on current issues/trends by public health leaders.

PubH 5301. Perspectives: Interrelationships of People and Animals in Society Today. (2 cr. Prereq–§3301, §UC 4301, §CVM 6050)
Social, psychological, economic, and health consequences of people/animal relationships. Diversity of cultural perspectives on human/animal relationships. Animals and people sharing an urban environment. Hunting and wildlife conservation. Biomedical research. Animal rights and human/animal bond.

PubH 5320. Fundamentals of Epidemiology. (3 cr. Prereq–Pub hlth or grad student or #)
Basic concepts and knowledge of epidemiology, a methodology used to study the etiology, distribution, and control of diseases in human populations.

PubH 5330. Epidemiology I. (4 cr. Prereq–Epi major or #)
Basic epidemiologic principles applicable to infectious and noninfectious disease; host-agent environment complex; factors underlying spread of infectious disease; laboratory applications of statistical and epidemiologic methods.

PubH 5333. Principles of Human Behavior I. (2 cr; A-F only. Prereq–Che or epi major or #)
Theoretical perspective on etiology/modification of health behavior in individuals/communities.

PubH 5334. Human Behavior II. (2 cr; A-F only. Prereq–[5333, Epi grad student in behavioral track] or #)
Critical evaluation of major behavioral public health intervention research. Experience in research designs/methods in health behavior intervention.

PubH 5335. Epidemiology and Control of Infectious Diseases. (2 cr. Prereq–Epi major or #)
Principles and methods. Strategies for disease control and prevention, including immunization. Relevance of modes of transmission of specific agents for disease spread and prevention. Public health consequences of infectious diseases at local, national, and international levels.

PubH 5336. Advanced Seminar in Infectious Disease Epidemiology. (1 cr [max 2 cr]; S-N only. Prereq–5330, 5335, #)
How infectious disease epidemiologic principles are applied in the "real world" to contemporary or controversial issues, including development of prevention and control strategies.

PubH 5337. Analysis of Infectious Disease Data. (2 cr; A-F only. Prereq–5330, 5340, 5335, [EPI or MPH or EPI] grad student, #)
Methods to analyze/model infectious disease data. Emphasizes critical understanding of methods, statistical analysis specific to infectious disease areas. Infection models, surveillance/epidemic modeling, transmission models, pathogenesis models.

PubH 5340. Epidemiology II. (4 cr. Prereq–5330, 1 biostats course or #)
Measures of disease occurrence; strategies and design principles for etiologic and evaluative studies. Measurement of problems, interactions, sensitivity and precision, validity, and need for data specification and control of variables.

PubH 5345. Epi Methods: Data Collection. (2 cr. Prereq–[5330, 5450, [Epi MPH or clin research student]] or #)
Methods/techniques for collecting/managing epidemiologic research data. Practical aspects of sampling, response rates/bias, forms design, selecting/training interviewers. Data preparation, entry, cleaning, management. Ethical issues in research.

PubH 5348. Writing Research Grants. (2 cr; S-N only. Prereq–[EPI or CR] grad student or #)
Focuses on NIH-type grants. Mechanics of grant development/writing, principles of informed consent, budget development, grant-review process, and identifying funding sources.

PubH 5351. Molecular Epidemiology. (2 cr; A-F only. Prereq–PubH 5330, at least one college-level general biology course, [Epi MPH or Epi grad student or #])
Introduction to molecular epidemiology. Sample collection, processing, methodology. Biomarkers used in cancer, cardiovascular disease, and infectious epidemiologic studies.

PubH 5363. Design and Analysis of Group-Randomized Trials in Epidemiology. (3 cr. Prereq–5340, 5452, [EPI MPH or EPI] grad student, #)
Community, school-based, and work-site trials. Trials involving randomization of other identifiable groups to study conditions. Experimental/quasi-experimental designs and threats to their validity.

PubH 5365. Epidemiology of Aging. (2 cr. Prereq–Grad or professional school student, 5330 or equiv or #)
Major concepts and issues. Emphasizes methodological issues unique to studies of older populations with measurement of epidemiologic characteristics especially important. Scope of epidemiologic studies of older populations; most prevalent health conditions.

PubH 5370. Alcohol and Other Drugs: Epidemiology, Prevention, and Control. (3 cr. Prereq–Eh or epi grad major or pub hlth or biol or dent or nurs grad or med school or pharm student or #)
Population patterns regarding who uses which drugs, why they use them, and health consequences of alcohol and other drug use. Does not focus on treatments, care, rehab, or exploration of personal attitudes, practices regarding alcohol or other drug use.

PubH 5379. Epidemiology Master's Project Seminar. (1 cr; S-N only. Prereq–#)
Seminar for epidemiology MPH master's project presentations. Students present their projects and give/receive feedback.

PubH 5381. Genetics in Public Health. (2 cr. Prereq–Grad or professional school student or #)
Mechanisms of molecular genetics. Issues related to medical/public health genetics, including basis of human diversity, Human Genome Project, novel genetic mechanisms underlying diseases, ethical/legal issues.

PubH 5386. Public Health Aspects of Cardiovascular Disease. (2 cr. Prereq–[5330, 5450] or equiv; students in 2-yr program take course in yr 2)
Detailed perspective on well-established risk factors for CVD, prevention of CVD, and national recommendations for treatment/prevention. Introduces emerging risk factors and current controversies in CVD.

PubH 5387. Cancer Epidemiology. (2 cr. Prereq–5330, 5340, hlth sci grad and professional school student or #)
Epidemiologic aspects of cancer, including theories of carcinogenesis, incidence, site-specific risk factors, and issues of cancer control and prevention.

PubH 5389. Nutritional Epidemiology. (2 cr. Prereq–5330 or #)
Study of nutrition/disease relationships through application of epidemiologic methods. Characterization of various exposures to food and nutrient intakes, biological basis for nutrition/disease relationships, studies of specific chronic diseases and nutritional intake, design and interpretation of studies using nutritional measures.

PubH 5396. Field Experience: Epidemiology. (1-4 cr [max 4 cr]; S-N only. Prereq–[Epi MPH or grad student], #)
Supervised epidemiologic field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems.

PubH 5399. Topics: Epidemiology. (1-4 cr [max 20 cr]. Prereq–#)
Topics of interest in epidemiology.

PubH 5414. Biostatistical Methods I. (3 cr. §5450. Prereq–Pub hlth or hlth sci grad student or #)
Descriptive statistics, graphical methods. Use of Excel. Proportions, relative risk, odds ratios. Random sampling. Estimates of mean, medians, measures of variability. Normal distribution, t-/chi-square tests. Confidence intervals. Correlation/regression. Inference/causality.

PubH 5415. Biostatistical Methods II. (3 cr. Prereq–PubH 5414)
Statistical computing using SAS. Multiple regression. Data transformations. Relative risk, odds ratio estimation. Logistic regression. Survival analysis. Kaplan-Meier tables, survival curves.

PubH 5420. Introduction to SAS Programming. (1 cr. Prereq–Health sciences grad student or #)
Use of SAS for analysis of biomedical data. Data manipulation/description. Basic statistical analyses (t-tests, chi-square, simple regression).

PubH 5421. Advanced Statistical Computing. (3 cr. Prereq–[5465, biostatistics major, [C or FORTRAN]] or #)
Statistical computing using SAS, Splus, and FORTRAN or C. Use of pseudo-random number generators, distribution functions. Matrix manipulations with applications to regression and estimation of variance. Simulation studies, minimization of functions, nonlinear regression, macro programming, numerical methods of integration.

PubH 5450. Biostatistics I. (4 cr. Prereq–[Math 1031, health science grad student] or #)
Descriptive statistics. Gaussian probability models, point/interval estimation for means/proportions. Hypothesis testing, including t, chi-square, and nonparametric tests. Simple regression/correlation. ANOVA. Health science applications using output from statistical packages.

PubH 5452. Biostatistics II. (4 cr. Prereq–[5450, competence in SAS through 5420] or equiv or grade of at least B in [5414, 5415])
Two-way ANOVA, interactions, repeated measures, general linear models. Logistic regression for cohort and case-control studies. Loglinear models, contingency tables, Poisson regression, survival data, Kaplan-Meier methods, proportional hazards models.

PubH 5456. Proseminar for the Biostatistician. (2 cr. Prereq–5466, biostats major or #)
Professional roles and responsibilities of the practicing biostatistician as consultant and collaborator in health sciences research.

PubH 5460. Introduction to Biostatistical Thinking. (1 cr; S-N only)
Aspects of Biostatistics as practiced U of M and as described in research literature.

PubH 5462. Clinical Trials: Design, Implementation, and Analysis. (3 cr. Prereq–5452 or 5466 or #)
Introduction to and methodology of randomized clinical trials: design issues, sample size, operational details, interim monitoring, data analysis issues, and overviews.

PubH 5465. Biostatistics: Regression. (4 cr. §5450, §5452. Prereq–[[Stat 5101 or ¶Stat 5101], biostats major] or #)
T-tests, confidence intervals, power, type I/II errors. Exploratory data analysis. Simple linear regression, regression in matrix notation, multiple regression, diagnostics. Ordinary least squares, violations, generalized least squares, nonlinear least squares regression. Introduction to General linear Model. SAS and S-Plus used.

PubH 5466. Biostatistics: ANOVA and Design. (4 cr. §5450, §5452. Prereq–5465, [[Stat 5102 or ¶Stat 5102], biostats major] or #)
Single factor ANOVA, diagnostics, classical non-parametrics, multifactor ANOVA, multiple comparisons, power and sample size determination, calculating expected mean squares, random/mixed effects models. ANOVA in regression notation. Randomized block designs, nested designs, repeated measures designs, cross-over designs. SAS and S-Plus used.

PubH 5467. Analysis of Categorical Data. (3 cr. Prereq–[5466 or equiv], Stat 5102)
Contingency tables, odds ratio, relative risk, chi-square tests, log-linear models, logistic regression, conditional logistic regression, Poisson regression, matching, generalized linear models for independent data. SAS/S-Plus used throughout.

PubH 5470. Topics: Biostatistics. (1-4 cr [max 20 cr]. Prereq–#)
Topics of interest in biostatistics.

PubH 5482. Latent Variable Models. (3 cr. Prereq–[5414, 5415] or [5450, 5452] or #)
Introduction to use of statistical techniques known collectively as latent variable models. Exploratory/confirmatory factor analysis, path analysis, structural equation modeling, latent trait models, latent class models. SAS/AMOS software are used.

PubH 5483. Statistical Methods for Correlated Data. (3 cr. Prereq–[[5420 or equiv], [5452 or 5466 or Stat 5303 or equiv], familiarity with matrix notation] or #)
Correlated data arising from data collected over time or space, group randomizations, cluster sampling, nested designs, or random effects assumptions. Modeling, analysis, and interpretation appropriate for such data, for normally or non-normally (e.g. binary, Poisson, gamma) distributed outcomes. Computing using SAS software.

PubH 5494. Master's Project: Biostatistics. (1-3 cr [max 3 cr]; S-N only. Prereq–[Bio MPH or grad student], #)
Directed research toward completion of Master's or Plan B project in biostatistics.

PubH 5501. Fundamentals of Clinical Research. (3 cr. Prereq–Clinical research student or #)
Concepts of clinical research design/implementation. Concepts that aid in applied investigation in epidemiology/biostatistics.

For definitions of course numbers, symbols, and abbreviations, see page 296.

PubH 5502. Clinical Research Literature Review Seminar. (1 cr. Prereq–Clinical research grad student or #)
Students review clinical research literature, critique: hypotheses/goals, methodology of population selection, study design, subject measurement.

PubH 5503. Clinical Research Project Seminar. (2 cr. Prereq–[5502, clinical research grad student, master's project/thesis paper [underway or near completion]] or #)
Students to present their master's project/thesis, give/receive feedback.

PubH 5510. Topics: Clinical Research. (1-4 cr [max 20 cr]. Prereq–#)
Topics of interest in clinical research.

PubH 5550. Clinical Research: Introductory Seminar for Health Professionals. (2 cr. Prereq–[Bachelors degree or degree from health professional program or grad student in [dentistry or medicine or nursing or pharmacy or public health or veterinary medicine]], #)
Design/implementation of clinical research protocols. IRB, FDA, other regulations. Practical tools for survey management. Taught by Clinical Research graduate faculty and guest lecturers.

PubH 5592. Readings in Clinical Research. (1-4 cr [max 4 cr]. Prereq–CR grad student, #)
Current readings in clinical research.

PubH 5593. Directed Study: Clinical Research. (1-4 cr [max 4 cr]. Prereq–CR grad student, #)
Directed research or field practice in clinical research.

PubH 5605. Reproductive and Perinatal Health. (2 cr; A-F only. Prereq–Pub hlth or grad student or #)
Issues, programs, services, and policies. Social, cultural, psychological, physiologic, environmental, economic, and political factors that affect reproductive health, pregnancy, and childbearing.

PubH 5606. Health of Children. (2 cr. Prereq–Pub hlth or grad student or #)
Overview of public health issues related to children in the United States. Focus on identifying and planning effective public health strategies, policies, and programs to improve the health of infants and children.

PubH 5607. Adolescent Health: Issues, Programs, and Policies. (2 cr. Prereq–Pub hlth or grad student or #)
Major public health issues of adolescents in the United States. Emphasis on prevention and health promotion strategies and on effectiveness of programs and policies.

PubH 5610. Principles of Maternal and Child Health. (2 cr. Prereq–Pub hlth or grad student or #)
For MCH students and others interested in learning about the needs of children and families. Examines MCH activities in the context of "Healthy People 2000," including the history and organization of programs, policies, and advocacy activities.

PubH 5613. Chronic Illness and Disability in Childhood: Principles, Programs, and Policies. (2 cr. Prereq–Pub hlth or grad student or #)
Principles, policies, programs, and practices for identifying and meeting the needs of children and adolescents with chronic health conditions and of their families. Skills emphasized: needs assessment, program development/evaluation, family empowerment, interdisciplinary team building, integrated/coordinated service delivery, advocacy.

PubH 5627. Sexuality Education: Criteria, Curricula, and Controversy. (1 cr. Prereq–Prefer public health student or grad student or professional in public health or in education; 5 seats reserved for UC students)
Issues/controversies affecting K-12 sexuality education. Current research/guidelines for effective, responsible education and curricula selection. Various curricula being used in the United States. Challenges in teaching sensitive issues inherent in sexuality education.

PubH 5628. Seminar: Race, Class, and Family Formation. (1 cr; S-N only. Prereq–Public health student or grad student or #)
Impact of race/class on family formation, family dynamics, and family resiliency/maintenance. Explores whether traditional approaches in family intervention are effective among individuals who are not engaged in traditional social institutions.

PubH 5634. Advocating for Change for Children. (2 cr. Prereq–Pub hlth or grad student or #)
Strategies for changing systems, building skills in public policy research, information/perception management, coalition building, personal persuasion, advocacy.

PubH 5639. Prevention: Theory, Practice, and Application in Public Health Service. (3 cr. Prereq–Jr or sr or grad student or professional school student)
Current issues/controversies around prevention and how it relates to health services. History of prevention as an idea. Terminology, lifestyle intervention. Programs and legislative issues. Education, roles/implications for societal action.

PubH 5645. Families and Health: an Ecosystems Approach. (2 cr. Prereq–Pub hlth or grad student or #)
Interrelationships between individual, family, and community health. Family theories/research, effect of sociocultural context, public policies, and community structures on health. Primary/secondary prevention strategies for promoting family health.

PubH 5648. Topics: Maternal and Child Health. (1-4 cr [max 20 cr]. Prereq–#)
Topics of interest in maternal/child health.

PubH 5654. Adolescent Sexual Identity: Teen Risk and Professional Responsibility. (1 cr. Prereq–Professional in pub hlth or medicine or ed or soc work or counseling or youth service)
Issues that gay, lesbian, and bisexual adolescents and their families face in coming to terms with sexual orientation. Helpful ways to work with this hidden population and their families. One-day workshop.

PubH 5655. Sexual Orientation Issues for Adolescents. (2 cr. Prereq–Baccalaureate degree or employment in ed or hlth or soc service field)
Adolescent sexual orientation from perspective of individual identity; impact of the community and response of the community toward gay, lesbian, bisexual, and transgender youth; and interventions/roles of professionals in the school and community.

PubH 5661. Community Organizing for Public Health. (2 cr. Prereq–Pub hlth or grad student or #)
Principles of community organizing. Challenges/strategies for public health professionals engaged in community organizing. Decreasing barriers to community participation, encouraging leadership, building coalitions/alliances, sustaining community organizing efforts.

PubH 5673. Grant Writing for Public Health. (1 cr. Prereq–MCH or CHE or PubH Nutr or EPI MPH or #)
Hands-on workshop. Focuses on children, youth, and families. Identifying successful elements of a grant application. Grant review process. Critiquing a grant. Writing an application.

PubH 5691. Independent Study: Maternal and Child Health. (1-4 cr [max 4 cr]. Prereq–MCH major, #)
Independent study supervised by a Maternal and Child Health faculty member.

PubH 5694. Master's Project: Maternal and Child Health. (2-4 cr [max 4 cr]; S-N only. Prereq–MCH major, #)
Directed research toward completion of the master's project in maternal and child health.

PubH 5696. Field Experience: Maternal and Child Health. (2-4 cr [max 4 cr]; S-N only. Prereq–MCH major, #)
Supervised maternal/child health field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems.

PubH 5700. Foundations of Public Health Administration. (3 cr. Prereq–PHA major or #)
Organization of public health, predominately in the United States. Role of public health administration. Problem-solving skills necessary for effective administration.

PubH 5705. Community Health Assessment. (2 cr. Prereq–[Grad-level epidemiology course, [public health or grad] student] or #)
Two of three core functions of public health: health assessment, assurance. Lectures, group activities, individual presentations.

PubH 5708. Analysis of Administrative Data. (3 cr. Prereq–Public health or grad student or #)
How to use data for various research designs. Origin, quality, strengths, limitations of data. Files based on Medicare/Medicaid data are used for hands-on learning. Emphasizes broad concepts/skills.

PubH 5711. Public Health Law. (2 cr. Prereq–Pub hlth student or #)
Basic concepts of the law, legislative process, legal bases for the existence and administration of public health programs, legal aspects of current public health issues and controversies, and regulatory role of government in the health services system.

PubH 5717. Decision-Making Under Uncertainty. (2 cr. Prereq–PubH or grad student or #)
Introduction to theory/application of decision analysis. Focuses on normative (as opposed to descriptive) modeling of decision-making under uncertainty.

PubH 5721. Managing Collaborative Networks. (2 cr. Prereq–Grad student or professional school student or #)
How to manage inter-organizational networks to coordinate provider organizations for associations and rural health networks.

PubH 5724. The Health Care System and Public Health. (3 cr. Prereq–Public health or grad student or #)
Overview of health care delivery, finance systems within public health context. Components of health care system: financing, role of employers/public programs, health care delivery system, managed care. Collaborative interventions between managed care, public health.

PubH 5726. Medical Device Industry: Business and Public Policy. (3 cr. Prereq–Public health or grad student or #)
Business, public policy, regulatory, technology management issues concerning medical device/biotechnology industries. Nature/effects of private-public sector interactions. Involvement by leaders in Minnesota organizations.

PubH 5740. Organizational Behavior. (2 cr. Prereq–Pha major or #)
Human behavior in organizations; motivation, leadership, influence of organizational structure, informal group behavior, interpersonal relations, supervision. Preventing and solving problems among individuals and groups in organizations.

PubH 5741. Ethics in Public Health: Professional Practice and Policy. (1 cr. Prereq–Public health or grad student or #)
Introduction to ethical issues in public health practice/policy. Ethical analysis, recognizing/analyzing moral issues.

PubH 5742. Ethics in Public Health: Research and Policy. (1 cr. Prereq–Public health or grad student or #)
Introduction to ethical issues in public health research/policy. Ethical analysis. Recognizing/analyzing moral issues.

PubH 5751. Principles of Management in Health Services Organizations. (2 cr. Prereq–[Grad or professional school] student)
Role of health-care services administrators, principles of management, administrative process. Lectures, case studies.

PubH 5752. Public Health Management. (3 cr. Prereq–[Grad or professional school] student or #)
Managing projects/organizations in public health. Skills/knowledge necessary to determine mission of an organization, structure it to support individuals in their work, and motivate/manage to achieve goals.

PubH 5760. Healthcare Financial Management: Public Sector Emphasis. (2 cr. Prereq–Grad student or professional school student or #)
Theory of managerial/financial accounting and of healthcare finance as they relate to program development for non-profit organizations.

Emphasizes methods whereby programmatic goals/objectives can be integrated into financial planning, budget preparation, and budget control. Examining an overall program through financial analytical techniques.

PubH 5761. Financial Analysis: Topics for Public Health. (1 cr. Prereq–Grad student or professional school student or #)
How financial management intersects at macro/micro level. Focuses on financial analysis at department, organizational, and system level. Financial trends.

PubH 5762. Health Finance Applications. (2 cr. Prereq–5761, [grad student or professional school student or #])
Top management perspective of healthcare financial management responsibility in context of strategic issues. Emphasizes balancing theory and applications. Capstone course.

PubH 5780. Topics: Public Health Administration. (1-4 cr [max 20 cr]. Prereq–#)
Topics of interest in public health administration.

PubH 5791. Independent Study: Public Health Administration. (1-4 cr [max 4 cr]. Prereq–PHA major, #)
Independent study supervised by a public health administration faculty member.

PubH 5794. Master's Project: Public Health Administration. (3 cr; S-N only. Prereq–PHA major, #)
Students work with their adviser to complete one of three types of master's projects: research project, critical literature review, or applied field project.

PubH 5796. Field Experience: Public Health Administration. (3 cr; S-N only. Prereq–PHA major, #)
Supervised public health administration field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems.

PubH 5802. Seminar: Technology of Data Operations in Health Care Studies. (3 cr. Prereq–Familiarity with [Windows-based environment, Microsoft Word, Excel, Access, Web browser, graphical package, data collection/analysis projects, internet] or #)
Overview of data collection tools in health care studies: workflow design; scanned/faxed, web-based forms; voice response; palmtop computers; relational databases. Managing workflow. Selecting tools to ensure data quality and low cost. Case studies.

PubH 5806. Principles of Public Health Research. (2 cr. Prereq–Pub hlth or grad or professional school student or #)
Evaluation of public health research literature and planning for independent research projects. Formulation of research question, research design, sampling techniques, use of research concepts, and data analysis. Data collection techniques, including questionnaires, interviews, and data analysis.

PubH 5812. Managed Care. (3 cr; A-F only. Prereq–Pha or hsrp&a major or MHA student or #)
Development/organization of HMOs. Risk sharing. Provider contracts. Utilization management. Quality improvement. Marketing and new product development. Employer relations. Medicare/Medicaid contracting. Budgeting. Financial performance. Pricing. Regulation.

PubH 5832. Economics of the Health Care System. (3 cr; A-F only. Prereq–Microecon theory course or #)
Economic analysis of U.S. health-care sector. Emphasizes problems of pricing, production, and distribution. Health-care services as factor contributing to nation's health.

PubH 5835. Health Services Policy. (2 cr. Prereq–PHA major or [HSRPA or MHA or PA] grad student or #)
Social, political, and economic context within which U.S. health-care system developed. Influence of these contextual elements on public policies guiding/regulating organization/delivery of health services.

PubH 5852. Program Evaluation in Health and Mental Health Settings. (3 cr. Prereq–#)
Overview of evaluation, models of evaluation, objectives of an evaluative study, sampling of subjects, methods of data collection, methodological designs, interpretation of data, preparation of final report, and ethical and political considerations.

PubH 5861. Health Insurance. (2 cr; A-F only. Prereq–Microecon theory course or #)
Financing personal health care: theory of insurance, health insurance markets, cost sharing, HMOs, PPOs, public and catastrophic health insurance, and the uninsured. Emphasis on public policy.

PubH 5862. Cost-Effectiveness Analysis in Health Care. (3 cr. Prereq–#; introductory econ course recommended)
Government regulations. New technologies. Diagnosis/treatment protocols. Strengths, limitations, appropriateness of different approaches.

PubH 5863. Understanding Health-Care Quality. (2 cr)
Introduction to assessing and assuring quality of care. Emphasizes both process and outcomes approaches, paralleling interest in the appropriateness and effectiveness of care. Issues around creating needed behavioral changes.

PubH 5864. Conducting Health Outcomes Research. (3 cr. Prereq–Intro crse in [epidemiology or health services research methods] or #)
Major concepts/principles in conducting health outcomes research that evaluates medical care. Developing study designs matched to research questions. Frequently used study designs. Evaluating health outcomes. Analytical approaches.

PubH 5881. Topics: Health Services Research and Policy. (1-4 cr [max 20 cr]. Prereq–#)
Topics of interest in health services research/policy.

PubH 5900. Public Health Nutrition: Principles and Programs. (2 cr. Prereq–Pub hlth nutr major or #)
Principles of public health nutrition, roles and functions of public health nutritionists, programs and delivery mechanisms for promoting nutritional status of populations. Students explore their beliefs and competencies in relation to principles and philosophy of public health nutrition.

PubH 5902. Maternal and Infant Nutrition. (2 cr. Prereq–3xxx nutr course or equiv or #)
Nutritional needs of childbearing women and of infants. How to meet these needs through programs/services.

PubH 5905. Human Nutrition and Health. (2 cr. Prereq–Jr or sr or grad or professional school student)
Broad range of nutrition topics of contemporary interest. Concepts and facts about science of human nutrition in relation to personal and community nutrition problems and concerns. Applied, introductory graduate-level course with labs.

PubH 5907. Assessment of Dietary Intake. (1 cr. Prereq–Pub hlth nutr major or #)
Methods for assessing dietary intake of populations and individuals; appropriate uses of dietary assessment methods in public health, clinical, and research settings; evaluation and interpretation of dietary data.

PubH 5908. Anthropometric Assessment of Nutritional Status. (1 cr. Prereq–5450 or 5414 or equiv, grad or professional school student)
Anthropometry as used to assess nutritional status; training and experience in taking basic measurements; practical experience in anthropometry; conceptual rationales and interpretation of anthropometric data.

PubH 5909. Topics: Public Health Nutrition. (1-4 cr [max 20 cr]. Prereq–#)
Topics of interest in public health nutrition.

PubH 5910. Critical Review of Research in Public Health Nutrition. (1 cr. Prereq–Pub hlth nutr or mch major, grad-level course each in research, biostats, epi or #)
Applying principles of nutrition, epidemiology, and biostatistics to evaluate scientific research on topics of significance in public health nutrition. Interactive seminar format with lecture, discussion, and student presentations.

PubH 5911. Biochemical Assessment. (1 cr. Prereq–Grad or professional school student, 5450 or 5414 or equiv or #)
Use of biochemical measurements for evaluation of nutritional status. Biochemical measurement methods, data analysis, and application of reference data; protein, vitamin, and mineral status.

PubH 5914. Community Nutrition Intervention. (3 cr. Prereq–Grad or professional school student or #)
Nutrition intervention strategies used in health programs. Selecting appropriate strategies, applying them to specific target audiences, and evaluating their usefulness in relation to program objectives.

PubH 5932. Nutrition: Adults and the Elderly. (2 cr; A-F only. Prereq–Grad or professional school student or #)
Current literature and research on nutrition needs and factors affecting nutritional status of adults and the elderly.

PubH 5933. Nutrition: Health/Disease Relationships. (2 cr. Prereq–5330, FScN 5622 or MdBc 5201 or equiv or #)
Issues in nutrition and public health; biological and epidemiologic bases for public health dietary recommendations. Relation of nutrition to heart disease, cancer, hypertension, obesity, and other conditions.

PubH 5935. Child and Adolescent Nutrition. (2 cr. Prereq–Grad or professional school student or #)
Current issues and literature. Major nutrition issues of youth; biological, cultural, and psycho-social factors influencing food behaviors; and strategies for improving nutritional health.

PubH 5991. Independent Study: Public Health Nutrition. (1-4 cr [max 4 cr]. Prereq–[PubH Nutr MPH student or Nutr grad student], #)
Independent study supervised by a Public Health Nutrition faculty member.

PubH 5994. Master's Project: Public Health Nutrition. (1-4 cr [max 4 cr]. Prereq–PubH Nutr major, #)
Directed research toward completion of master's project in public health nutrition.

PubH 5996. Field Experience: Public Health Nutrition. (1-6 cr [max 6 cr]; S-N only. Prereq–PubH Nutr major)
Supervised public health nutrition field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems.

Radiation Therapy Technologist (RTT)

College of Continuing Education

RTT 2001. Radiation Therapy: Radiation Exposure, Imaging, Safety, and Basic Care. (1 cr; A-F only. Prereq–B.A.S. student in radiation therapy program)
Introduction to technical aspects of radiologic sciences, standard patient care issues, and radiation oncology issues. Structure/function of X-ray equipment. Fundamental concepts of X-ray production, interaction, imaging, and safety. Physical/psychological aspects of patient care. Legal/ethical values in health care environment.

RTT 2002. Radiation Therapy: Radiation Exposure, Imaging, Safety, and Basic Care Lab. (1 cr; A-F only. Prereq–2001, B.A.S. student in radiation therapy program)
Fundamental topics of X-ray imaging and patient care skills in a hands-on environment. Focuses on simulation of procedures, clinical projects.

RTT 3001. Radiation Therapy: Introduction to Radiation Therapy. (1 cr; A-F only)
Basic overview of radiation therapy and its role in medicine.

RTT 3100. Radiation Therapy: Mathematics. (2 cr; A-F only)
Basic arithmetic, algebra, geometry, and trigonometry.

RTT 3110. Radiation Therapy: Basic Physics. (2 cr; A-F only)
Basic physics.

RTT 3120. Radiation Therapy: Radiation Physics I. (2 cr; A-F only)
Principles of basic physics applied to ionizing radiation. Radiation production, interaction, and protection.

RTT 3121. Radiation Therapy: Radiation Physics II. (3 cr; A-F only)
Technical aspects of radiation therapy. Treatment modalities and their properties, clinical dosimetry, treatment planning.

RTT 3122. Radiation Therapy: Advanced Dosimetry. (2 cr; A-F only)
Radiation oncology treatment planning. Three-dimensional conformal radiotherapy, intensity-modulated radiotherapy, radiosurgery, plan evaluation/interpretation.

RTT 3130. Radiation Therapy: Principles of Oncology I. (3 cr; A-F only)
General principles of radiation oncology. Imaging procedures, concept of disease, disease factors, disease management, treatment results.

RTT 3131. Radiation Therapy: Principles of Oncology II. (3 cr; A-F only)
General principles of radiation oncology. Imaging procedures, concept of disease, disease factors, disease management, treatment results.

RTT 3132. Radiation Therapy: Medical Oncology. (2 cr; A-F only. Prereq–3131)
Medical oncology principles. Basis for classification/action of cytotoxic drugs. Chemotherapy regimens, strategies, side effects, effect on radiotherapy patient.

RTT 3140. Radiation Therapy: Radiation Biology/Hyperthermia. (2 cr; A-F only)
Principles of cell response to radiation/hyperthermia.

RTT 3150. Radiation Therapy: Brachytherapy. (1 cr; A-F only)
Principles of radioactivity, its medical uses.

RTT 3160. Radiation Therapy: Methods of Patient Care. (1 cr; A-F only)
Concepts of radiotherapy patient care/management. Physical/psychological concerns.

RTT 3171. Radiation Therapy: Clinical Radiation I. (4 cr; A-F only)
Hands-on clinical experience in a working environment.

RTT 3172. Radiation Therapy: Clinical Radiation II. (6 cr; A-F only)
Hands-on clinical experience in a working environment.

RTT 3173. Radiation Therapy: Clinical Radiation III. (6 cr; A-F only)
Hands-on clinical experience in a working environment.

RTT 3174. Radiation Therapy: Clinical Radiation IV. (8 cr; A-F only. Prereq–3171, 3172, 3173)
Hands-on clinical experience in working environment. Students operate state-of-the-art radiotherapy equipment. Treatment decision-making, procedures, planning.

Recreation, Park, and Leisure Studies (Rec)

School of Kinesiology

College of Education and Human Development

Rec 1501. Orientation to Leisure and Recreation. (3 cr)
Introduction to the history and development of the parks and recreation movement; sociological, economical, psychological, and political considerations of leisure and recreation in contemporary society; interrelationship between professional and service organizations; orientation to the professional field.

Rec 2151. Outdoor and Camp Leadership. (3 cr; A-F only)
Practical and theoretical study of leading groups in outdoor and camp settings. Outdoor leadership skills, expedition planning, emergency procedures and risk management, minimum impact approaches, and working with youth in a camp environment.

Rec 3281. Research and Evaluation in Recreation, Park, and Leisure Studies. (4 cr; A-F only. Prereq–1501 or #)
Basic techniques; emphasis on social research and evaluation methodology; survey of present status of recreation and park research and evaluation.

Rec 3541W. Recreation Programming. (3 cr; A-F only. Prereq–[1501 or #], rec major)
Various methods, skills, materials needed for planning, developing, implementing, evaluating professional recreation programs for diverse populations in various settings.

Rec 3551. Administration and Finance of Leisure Services. (4 cr; A-F only. Prereq–3541 or #, rec major)
Principles and practices of financing and managing leisure service agencies in the public and private sector.

Rec 3601W. Leisure and Human Development. (3 cr)
Exploration of relevant issues concerning many roles of leisure in human development from influence on healthy fetal development to viability until death. Examination of diverse, multicultural perspectives on leisure, its centrality throughout history and influence on how civilizations define themselves.

Rec 3796. Senior Internship in Recreation, Park, and Leisure Studies. (1-12 cr [max 12 cr]; S-N only. Prereq–Rec sr, #)
Supervised field experience for pre-professional students in selected agencies.

Rec 3993. Directed Study in Recreation, Park, and Leisure Studies. (1-9 cr [max 24 cr]. Prereq–Rec major or #)
Self-directed study preceded by classroom study and possession of basic competence. Intended for scholarly projects (e.g., library or field research) or demonstration projects in the field of leisure studies and services. Not intended for additional fieldwork, internship, or programming experience.

Rec 5101. Foundations of Recreation. (3 cr; A-F only. Prereq–MEd or grad student or #)
Investigation of the rational, sociological, psychological, and philosophical foundations of the recreational use of leisure in contemporary society. Includes a survey of leisure services.

Rec 5111. Sports Facilities. (3 cr; A-F only. §Kin 5111. Prereq–Kin or rec major or #)
Steps in planning and building facilities for athletics, physical education, and sport for college, professional, and public use.

Rec 5115. Event Management in Sport. (3 cr; A-F only. Prereq–Grad student, #)
Techniques/principles of planning, funding, and managing sport events. Collegiate championships, non-profit events/benefits, professional events.

Rec 5161. Recreation Land Policy. (3 cr; A-F only. Prereq–1501 or 5101 or #)
Historical development of recreational land policy in the United States and related contemporary issues in policy, management, interpretation, and research.

Rec 5191. Commercial Recreation and Tourism. (3 cr; A-F only. Prereq–3551 or #)
Scope and development of profit-oriented recreation agencies, including an emphasis on the tourism industry.

Rec 5211. Introduction to Therapeutic Recreation. (3 cr; A-F only. Prereq–1501 or ¶5101, rec major or #)
Purposeful intervention; roles of specialist/recreation therapists in meeting cognitive, physical, emotional, social needs of people with disabling conditions through recreation services; roles of specialist/recreation therapists changing societal attitudes toward illness and disability and the self-concepts of individuals with impairments.

Rec 5215. Assess and Monitor Patient/Client Functioning in Recreation Therapy. (3 cr; A-F only. Prereq–TR major or academic health professional or #; majors)
Selecting appropriate techniques/tools, analysis of individual p/c supports/deficits. Monitoring/recording progress in RT and in collaborative services: standard notes; team meetings; on-line reporting for quality assurance, referral, augmentation/termination of services.

Rec 5221W. Comprehensive Therapeutic Recreation Services Development and Management. (4 cr. Prereq–5211 or #, rec major)
Guided development of written plans including development of protocols and critical pathways, intervention programs/activities, individual treatment plans and standards for appropriate placement of individuals in group intervention, and management of patient/client service delivery, record keeping, and administrative responsibilities.

Rec 5231. Therapeutic Recreation and Diagnostic Groups. (3 cr; A-F only. Prereq–5211 or #)
Definitions, philosophies, methodologies regarding therapeutic recreation services for persons in diagnostic groups of cognitive, physical, sensory, communication, and psychiatric impairments/disabilities. Lectures, group discussion. Presentations by parents, professionals, and self-advocates. Clinical or community practicum assignment.

Rec 5241. Functional Intervention: Recreation Therapy in Geriatric Care. (3 cr; A-F only. Prereq–3541 or 5111 or #)
Role of leisure in maintenance of mental, physical, social-emotional health/functioning. Issues relative to prevention of impairment/disability. Rehabilitation, support of vital life involvement, effect on design/delivery of recreation services.

Rec 5271. Community Leisure Services for Persons With Disabilities. (3 cr; A-F only. Prereq–1501, rec major, or #)
Exploration and application of concepts and techniques of normalization and least restrictive environment strategies to leisure service delivery in inclusive community settings for a range of individuals with disabilities.

Rec 5288. Grant Writing in Human Services. (3 cr; A-F only)
Identify, develop, and procure financial assistance for programs in human services, including education, recreation, and social programs. Skills and strategies for preparing and evaluating competitive proposals for grant support through federal agencies and private foundations or corporations.

Rec 5301. Wilderness and Adventure Education. (4 cr; A-F only)
Rationale for, methods in applying wilderness/adventure education programs in education, recreation, corporate, human service settings. Emphasizes adventure/wilderness program management.

Rec 5311. Programming Outdoor and Environmental Education. (3 cr; A-F only)
Methods, materials, and settings for developing and conducting environmental and outdoor education programs.

Rec 5421. Sport Finance. (3 cr; A-F only. Prereq–Grad student, #)
Introduction to financial analysis in sport. Cash flow statements, budgeting issues, traditional/innovative revenue producing strategies available to sport organizations. Discussion, practical analysis of current market.

Rec 5461. Foundations of Sport Management. (3 cr; A-F only. Prereq–[Rec or Kin] student or #)
Theories/techniques in administering/managing sport enterprises. Organizational theory/policy. Practical examples of sport management skills/strategies.

Rec 5511. Women in Sport and Leisure. (3 cr; A-F only. §Kin 5511)
Critically examines women's involvement in/contributions to sport, physical activity, and leisure.

Rec 5601. Ethics in Sport Management. (2 cr; A-F only. Prereq–Grad student, #)
How we develop morally. Sport and perpetuation of violence in society. Moral reasoning. Moral/ethical conduct in sport. Historical, philosophical, and sociological perspectives. Critical reading, writing, discussion.

Rec 5631. Programming and Promotion in Sport. (3 cr; A-F only. Prereq–Grad student, #)
Introduction to marketing concepts as they apply to sport industry. Consumer behavior, market research, marketing mix, corporate sponsorship, licensing concepts. Discussion, practical application.

Rec 5801. Legal Aspects of Sport and Recreation. (4 cr; A-F only. §Kin 5801. Prereq–3551 or 5461 or #)
Legal issues related to recreation, park, and sport programs/facilities with public/private sectors.

Rec 5900. Special Topics: Contemporary Issues in Leisure Services. (1-12 cr [max 12 cr])
Contemporary issues emphasizing administrative and supervisory functions for recreation and allied professionals; individual offerings, to be determined by faculty, focus on special issues and professional groups.

Rec 5981. Research Methodology in Kinesiology and Leisure Studies. (3 cr; A-F only. §Kin 5981. Prereq–MEd or grad student or #)
Defines and reviews various types of research in exercise and sport science, physical education, and recreation studies. Covers qualitative research, field studies, and methods of introspection as alternate research strategies instead of relying on traditional scientific paradigm.

Rec 5992. Readings: Recreation. (1-3 cr [max 9 cr]. Prereq–#)
Independent study under tutorial guidance by a faculty member in leisure studies. Intended as an opportunity to conduct in-depth study and reading on particular topic(s) not covered in regular coursework.

Rec 5995. Problems in Recreation, Park, and Leisure Studies. (1-12 cr [max 30 cr]. Prereq–MEd or grad student or #)
Independent study of leisure service programs, systems, facilities, or policies; focus on conduct of recreation programs. Intended for scholarly projects (e.g., library or field research) or demonstration projects in the field of leisure studies and services. Not intended for additional fieldwork, practicum, or programming experience.

Recreation Resource Management (RRM)

Department of Forest Resources

College of Natural Resources

RRM 3101. Natural and Heritage Based Tourism. (3 cr; A-F only)
Interaction of resource-based tourism with cultural/natural environments. Impacts of tourism on environment.

RRM 4232W. Managing Recreational Lands. (4 cr; A-F only)
Recreation management tools from a public agency perspective. Social carrying capacity, recreation opportunity spectrum, limits of acceptable change, benefits based management, visitor experience/resource protection. Various projects. Group project to develop a management plan.

RRM 5259. Visitor Behavior Analysis. (3 cr; A-F only. Prereq–RRM major or NRES major or grad student or #)
Application of social science theory/methods to recreation and resource-based tourism visitor behavior. Culture and cultural identity. Influences on behavior. Mitigating environmental impacts. Theory/analysis of surveys, observation, and content. Implications for sustainable resource management.

Religions in Antiquity (RelA)

Department of Classical and Near Eastern Studies

College of Liberal Arts

RelA 1001. Introduction to the Religions of the World. (3 cr)
An introduction to the major religions of the world and the academic study of religion. Hinduism, Buddhism, Judaism, Christianity, Islam, and some pre-Christian religions of Antiquity.

RelA 1031. Introduction to the Religions of South Asia. (3 cr)
Historical study of the three traditional religions of India: Hinduism, Buddhism, and Jainism through literature, art, and film. General topics include myth, yoga, mysticism, and the religious order of society.

RelA 1034. Introduction to Judaism. (3 cr. §3034, §JwSt 1034, §JwSt 3034. Prereq–No knowledge of Hebrew required)
Survey of intellectual history, literature, beliefs, practices, values, laws, national, and cultural developments from the rabbinic period through today. Ancient and modern sources used to study Judaism. Combines Western critical methodologies with the Jewish traditions of learning.

RelA 1035. Introduction to Christianity. (3 cr; A-F only)
Christian traditions throughout history. Emphasizes recurrent themes: reform/renewal, relations between church/society, varieties of spiritual formation, elusive pursuit of Christian unity.

RelA 1082. Jesus in History. (3 cr. §1182)
Jesus of Nazareth in his original setting. Modern approaches to the historical Jesus. Perspectives and needs of early gospel writers and effects of portrayals of Jesus. Shifting representations of Jesus in new historical and cultural situations. Meets with RelA 1182.

RelA 1082H. Honors Course: Jesus in History. (3 cr. §1082)
Jesus of Nazareth in his original setting. Modern approaches to historical Jesus. Perspectives/needs of early gospel writers, effects of portrayals of Jesus. Shifting representations of Jesus in new historical/cultural situations. Meets with 1082.

RelA 1083. Jesus the Jew. (3 cr. §3083)
Historic figure of Jesus within context of first century Palestinian Judaism. Main groups/institutions of Judaism at time of Jesus. Rabbinic literature/traditions. Works describing Jesus' life/sayings (synoptic gospels). Jesus and the Law, Messianic ideals/expectations, problem of religious authority. Positions regarding Rome, its authority. James and the Jerusalem Church.

RelA 3013W. Biblical Law and Jewish Ethics. (3 cr. §5013, §JwSt 3013, §JwSt 5013)
Significance of religious law in Judaism. Babylonian background of biblical law. Biblical creation of the person as a legal category. Rabbinic transformations of biblical norms. Covenant in Christianity/Islam. Contemporary Jewish literature/philosophy.

RelA 3034. Introduction to Judaism. (3 cr. §3034, §JwSt 1034, §JwSt 3034. Prereq–No knowledge of Hebrew required)
Survey of intellectual history, literature, beliefs, practices, values, laws, national, and cultural developments from the rabbinic period through today. Ancient and modern sources used to study Judaism. Combines Western critical methodologies with the Jewish traditions of learning.

RelA 3035. Introduction to Christianity. (3 cr; A-F only. §1035)
Christian traditions throughout history. Emphasizes recurrent themes: reform/renewal, relations between church/society, varieties of spiritual formation, elusive pursuit of Christian unity.

RelA 3036. Islam: Religion and Culture. (3 cr)
Religion of Islam, faith, practices, sectarian splintering, expansion outside original home to status of world religion, institutions, status in world societies—Asia, Europe, Americas.

RelA 3070. Topics in Ancient Religion. (3 cr)
Study of a specific aspect of religion in antiquity, such as healing cults, magic and divination, Gnosticism, or prophecy and authority. Topics vary by instructor and from year to year. Topics specified in *Class Schedule*.

RelA 3071. Greek and Hellenistic Religions. (3 cr. §3171)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, archaeology. Homer and Olympian deities; ritual performance; prayer and sacrifice; temple architecture; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions. Meets with 3171.

RelA 3071H. Honors: Greek and Hellenistic Religions. (3 cr. §3171)
Greek religion from Bronze Age to Hellenistic times. Sources include literature, art, archaeology. Homer/Olympian deities, ritual performance, prayer/sacrifice, temple architecture, death/afterlife, mystery cults, philosophical religion, Near Eastern salvation religions. Meets with 3071.

RelA 3072. The New Testament. (3 cr)
Early Jesus movement in its cultural and historical setting: origins in Judaism; traditions about Jesus; Paul, his controversies and interpreters; questions of authority, religious practice, and structure; emergence of the canon of scripture. Contemporary methods of New Testament study.

RelA 3072H. Honors Course: The New Testament. (4 cr. §3072, §3172, §Clas 3172, §Clas 3072. Prereq–Honors)
Early Jesus movement in its cultural/historical setting: origins in Judaism; traditions about Jesus; Paul, his controversies/interpreters; questions of authority, religious practice, structure; emergence of canon. Contemporary methods of New Testament study. Meets with 3072. Additional weekly recitation section.

RelA 3073. Roman Religion and Early Christianity. (3 cr)
Etruscan, Republican religion. Appeal of non-Roman cults. Ruler worship. Christians in Asia Minor, Egypt, and the West. Popular piety, Christian and non-Christian. Rabbinic Judaism. Varieties of Christianity in 2nd and 3rd centuries. Influence of Greco-Roman culture on emerging church. Constantine and Julian.

RelA 3083. Jesus the Jew. (3 cr. §1083, §Clas 1083, §JwSt 1083, §JwSt 3083)
Historic figure of Jesus within context of first century Palestinian Judaism. Main groups/institutions of Judaism at time of Jesus. Rabbinic literature/traditions. Works describing Jesus' life/sayings (synoptic gospels). Jesus and the Law, Messianic ideals/expectations, problem of religious authority. Positions regarding Rome, its authority. James and the Jerusalem Church.

RelA 3088. Archaeology in Biblical Lands I: Old Testament. (3 cr)
Archaeological data relevant to the Old Testament; major sites in the Holy Land and other areas of the Mediterranean and Near East. Evidence of pottery, inscriptions, manuscripts, and coins. Excavation methods. Archaeology as a tool for study of ancient religions.

RelA 3089. Archaeology in Biblical Lands II: New Testament Period. (3 cr)
Archaeological data relevant to the New Testament; major sites in the Holy Land and other areas of Mediterranean and Near East. Evidence of pottery, inscriptions, manuscripts, and coins. Excavation methods. Archaeology as a tool for study of ancient religions.

RelA 3112. Jewish Mysticism, Magic, and Kabbalah. (3 cr; A-F only)
Mystical traditions from early rabbinic traditions to Zohar (Book of Splendor) in 13th century. Literature of heavenly ascent (Hekhalot, Merkavah), Book of Creation (Sefer Yetzirah), precursors of Zohar—the Bahir. Schools of Provence, Gerona, and Zohar. Tension between legal/mystical aspects, magical theurgic techniques, evolution of doctrine of Sefirot, mystical interpretation of Scripture, erotic dimension.

RelA 3115. Mishnah and Midrash in Translation. (3 cr)
Jewish law studied as a mirror of society and as a way to actualize its value. Consideration of original socioreligious contexts and current applications. Selections include biblical interpretations addressing moral, theological, legal, and literary problems.

RelA 3126. Judaism in the Modern World. (3 cr. §JwSt 3126)
Jewish theology, religion, and ideology in the 19th and 20th centuries. American Judaism: orthodox, conservative, reform, reconstructionist; religious and communal organizational structures. Zionism in Europe, Israel, and America. Hasidism. Jewish responses to feminism and the democratic ideal.

RelA 3173. Honors Course: Roman Religion and Early Christianity. (4 cr)
Etruscan, Republican religion. Appeal of non-Roman cults. Ruler worship. Christians in Asia Minor, Egypt and the West. Popular piety, Christian and non-Christian. Rabbinic Judaism. Varieties on Christianity in 2nd and 3rd centuries. Influence of Greco-Roman culture on emerging church. Constantine and Julian. Honors recitation meets once a week for an additional recitation section. Meets with Clas 3173.

RelA 3201. The Bible: Narrative Texts. (3 cr. Prereq–Knowledge of Hebrew not required)
Survey of literary and historical narrative texts from the Pentateuch, Joshua, Judges, Samuel, Kings, Ruth. Study of the art of Biblical narrative and major themes of Biblical stories. Comparison with other Ancient Near Eastern Literatures. Literary conventions of the biblical writers.

RelA 3202. The Bible: Prophecy. (3 cr. Prereq–Knowledge of Hebrew not required)
Survey of Israelite prophets, with emphasis on Amos, Hosea, Isaiah, Jeremiah, Ezekiel and Second Isaiah. Prophetic contributions to Israelite religion. Personality of prophets. Politics and prophetic reaction. Textual analysis and Biblical scholarship. Prophecy viewed cross-culturally

RelA 3203. The Bible: Wisdom, Poetry, and Apocalyptic. (3 cr. Prereq–Knowledge of Hebrew not required)
Survey of books of Psalms, Proverbs, Job, Song of Songs, Lamentations, Ecclesiastes (Qoheleth). Characteristics of biblical poetry. Conceptions of Israelite wisdom writing. Traits of early Jewish apocalyptic writing.

RelA 3251. Modern Study of the Old Testament. (3 cr. Prereq–No knowledge of Hebrew required)
Methods used in studying the Old Testament, including textual criticism, the anthropological approach, the sociological approach, the history of religion, and the use of archaeology in interpreting the text.

RelA 3501. Ancient Israel: The Origins of Israel in Biblical Traditions. (3 cr. Prereq–Hebrew not required)
Foundation of the Hebrew people. Traditions of patriarchal period, development of Israelite religious/legal institution. Ancient Near Eastern context of Israel's origins.

RelA 3502. Ancient Israel: From Conquest to Exile. (3 cr. Prereq–Hebrew not required; 3501 recommended)
Israelite history in context of what is known from Egyptian, Canaanite, Mesopotamian sources. Focuses on issues raised by archaeological data related to Israelite conquest of Canaan.

RelA 3503. History and Development of Israelite Religion I. (3 cr. §5503. Prereq–No knowledge of Hebrew required)
Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

RelA 3504. Development of Israelite Religion II. (3 cr)
Ancient Judaism from the Persian restoration (520 BCE) to Roman times (second century CE). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, and Roman.

RelA 3993. Directed Studies. (2-4 cr [max 10 cr]. Prereq–Δ)
Student works with faculty on a subject decided upon by both.

RelA 5013. Biblical Law and Jewish Ethics. (3 cr. §3013, §JwSt 3013, §JwSt 5013)
Significance of religious law in Judaism. Babylonian background of biblical law. Biblical creation of the person as a legal category. Rabbinic transformations of biblical norms. Covenant in Christianity/Islam. Contemporary Jewish literature/philosophy.

RelA 5070. Topics in Ancient Religion. (3 cr. Prereq–RelA 3071 or 3072 or 3073 or 5071 or 5073 or any RelS course or #)
Study of a specific aspect of religion in Classical and Near Eastern antiquity such as healing cults, magic and divination, Gnosticism, or prophecy and authority. Topics specified in *Class Schedule.*

RelA 5071. Greek and Hellenistic Religions. (3 cr. §3071, §3171)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Homer and the Olympian deities; ritual performance; prayer and sacrifice; temple architecture; oracles; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions. Meets with 3071.

RelA 5072. The New Testament. (3 cr. §3072, §3172)
Early Jesus movement in its cultural, historical setting. Origins in Judaism; Jesus traditions. Apostle Paul, his controversies and interpreters. Questions of authority, religious practice, structure; emergence of the canon. Contemporary methods of New Testament study; biblical writings as history and narrative. Meets with 3072.

RelA 5073. Roman Religion and Early Christianity. (3 cr. §3073)
Etruscan, Republican religion. Appeal of non-Roman cults. Ruler worship. Christians in Asia Minor, Egypt, and the West. Popular piety, Christian and non-Christian. Rabbinic Judaism. Varieties of Christianity in 2nd and 3rd centuries. Influence of Greco-Roman culture on emerging church. Constantine and Julian. Meets with 3073.

RelA 5080. New Testament Proseminar. (3 cr. Prereq–RelA 1082 or 3072 or equiv)
Discussion seminar. Study of some specific aspect of the New Testament and related literature. Topics specified in *Class Schedule.*

RelA 5088. Archaeology in Biblical Lands I: Old Testament Period. (3 cr. §3088)
Archaeological data relevant to the Old Testament; major sites in the Holy Land and other areas of the Mediterranean and Near East. Evidence of pottery, inscriptions, manuscripts, and coins. Excavation methods. Archaeology as a tool for study of ancient religions. Meets with 3088.

RelA 5089. Archaeology in Biblical lands II: New Testament Period. (3 cr. §3089)
Archaeological data relevant to Jewish scriptures and New Testament; major sites in the Holy Land and other areas of the Mediterranean and Near East. Evidence of pottery, inscriptions, manuscripts, and coins. Excavation methods. Archaeology as a tool for study of ancient religions. Meets with 3089.

RelA 5112. Jewish Mysticism, Magic, and Kabbalah. (3 cr; A-F only)
Mystical traditions from early rabbinic traditions to Zohar (Book of Splendor) in 13th century. Literature of heavenly ascent (Hekhalot, Merkavah), Book of Creation (Sefer Yetzirah), precursors of Zohar—the Bahir. Schools of Provence, Gerona, and Zohar. Tension between legal/mystical aspects, magical theurgic techniques, evolution of doctrine of Sefirot, mystical interpretation of Scripture, erotic dimension.

RelA 5251. Archaeology of Herodian Israel. (3 cr; A-F only. Prereq–One course in [archaeology or ancient history] or grad student)
Archaeological sites in Israel dating to era of Herod the Great (37-4BC). Palaces, religious edifices, and remains from Jewish/gentile settlements throughout the kingdom. Course readings consist of contemporary literary sources and excavation reports.

RelA 5503. History and Development of Israelite Religion I. (3 cr. §3503)
Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

RelA 5504. Development of Israelite Religion II. (3 cr)
Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, Roman.

RelA 5513. Scripture and Interpretation. (3 cr; A-F only. §JwSt 5513)
Idea of divine revelation, its impact upon religion/literature. How history of Bible's creation, transmission, and interpretation helps us think critically about role of idea of revelation in history of religious traditions. What is revelation? How does belief that a text is revealed affect the way it is read within the community for which it constitutes revelation?

RelA 5993. Directed Studies. (2-4 cr [max 10 cr])
Guided individual reading or study.

Religious Studies (RelS)

Department of Classical and Near Eastern Studies

College of Liberal Arts

RelS 3070. Topics in Religious Studies. (1-4 cr; A-F only)
Topics specified in *Class Schedule* and *Course Guide.*

RelS 3521W. History of the Holocaust. (3 cr)
Study of the 1933-1945 extermination of six million Jews and others by Nazi Germany on the basis of race. European anti-Semitism, implications of social Darwinism and race theory, perpetrators, victims, onlookers, resistance, and theological responses of Jews and Christians.

RelS 5111. Problems in Historiography and Representation of the Holocaust. (3 cr. Prereq–JwSt 3521/RelS 3521 (formerly 3541) History of the Holocaust or #)
An advanced course focusing on issues connected with the Holocaust. Inclusiveness of other groups, Holocaust versus "Shoah," historiographical conflicts about perpetrators, an examination of the problems of representation in literature and art, problems of narrative theology after Auschwitz.

RelS 5251. Archaeology of Herodian Israel. (3 cr; A-F only. Prereq–One course in [archaeology or ancient history] or grad student)
Archaeological sites in Israel dating to era of Herod the Great (37-4BC). Palaces, religious edifices, and remains from Jewish/gentile settlements throughout

the kingdom. Course readings consist of contemporary literary sources and excavation reports.

RelS 5993. Directed Studies. (1-4 cr [max 24 cr])
Directed studies in religion. Credits may vary from term to term to a limit of nine.

Rhetoric (Rhet)

Department of Rhetoric

College of Agricultural, Food and Environmental Sciences

Rhet 1001. Introduction to Scientific and Technical Communication. (2 cr; S-N only)
Research origins/history. Defining technical communication in professional world. Focuses on audience, purpose, ethics, global communication, and collaboration. Journal articles, student/professional organizations, guest presentations, interviews. Career assessment inventories, in-class/electronic discussions, oral presentations, feasibility report.

Rhet 1101. Writing to Inform, Convince, and Persuade. (4 cr; A-F only)
Writing effectively in an academic setting. Emphasis on analyzing and creating logical arguments; standards of clarity, cohesion, and correctness. Readings and discussion of issues related to increasing cultural diversity of the United States.

Rhet 1152W. Writing on Issues of Science and Technology. (4 cr; A-F only. Prereq–Exemption from 1101 or equiv)
Ethical, social, and political challenges created by science/technology. Analyzes persuasion strategies through which experts, political decision-makers, and citizens meet these challenges. Bioscience controversies such as cloning, organ transplantation. Controversies over pollution, ozone depletion.

Rhet 1223. Oral Presentations in Professional Settings. (3 cr; A-F only)
Techniques for analyzing an audience, determining a purpose, developing an argument, and delivering a presentation. Emphasis on using presentations and basic communication theories.

Rhet 1302. Science, Religion, and the Search for Human Nature. (3 cr)
Relationship of religion and science as ways of explaining human nature and behavior. Focus on 19th century: impact of Darwin's theory and historical study of Biblical texts. Existentialism and political ecology as modern efforts that problematize "human nature."

Rhet 1311. The Family in American Experience. (3 cr)
The American family as portrayed in fiction, poetry, drama, and autobiography. Introduction to literature both as artistic and as ideological construct. Analysis of the social critique of American family life.

Rhet 1315. The Land in American Experience. (3 cr)
Land in America as idea and as actual space. History of cultural values and the meanings land holds for us. Contrasting views of land, especially those of certain Native American peoples. Rise of the conservation movement and the urbanization of U.S. space.

Rhet 1381W. Fictional History: 20th Century Through the Eyes of Novelists. (4 cr)
Analysis of selected 20th-century documentary novels; discussion of the nature of artistic truth in relation to historical truth; cross-cultural comparisons of responses to the impact of Anglo-American policies.

Rhet 1385. Contemporary Arts (a.k.a. Arts in the Twin Cities and Beyond). (3 cr)
Visual and performing arts in the Twin Cites: art museums and galleries, theaters, and concert halls. One weekly lecture with a lab for contemporary arts events. Optional practicum—a trip to New York City.

Rhet 3101. Functional Photography. (3 cr; A-F only. Prereq–3562 or DHA 1300)
Basic photographic communication with emphasis on techniques of producing 35mm color transparencies for use in presentations and publications. Students provide their own camera and film.

Rhet 3108W. Gender and the Rhetoric of Science and Technology. (4 cr)
How cultural gender roles are affected by science/technology. Influence of gender roles on scientific/technological thinking (e.g., communication strategies, language, image). Values/goals of past/present scientific/technological communities.

Rhet 3221W. Theories of Human Communication. (4 cr)
Through lecture, discussion, simulations, and small group work students become familiar with theories and practices of interpersonal, small group, organizational, and scientific, and technical communication.

Rhet 3257. Scientific and Technical Presentations. (3 cr. Prereq–1223 or #)
Oral presentation skills for scientific or technical topics. Visual communication, audience analysis, organizing a presentation, presenting complex material. Emphasizes use of computers.

Rhet 3266. Group Process, Team Building, and Leadership. (3 cr. Prereq–1223 or equiv or #)
Group processes, team building from perspective of managers/leaders. Communication techniques in small group decision making process. Theories of team/small-group communication. Case studies. Group project for each student.

Rhet 3270. Special Topics. (1-3 cr [max 3 cr]. Prereq–STC major or #)
See *Class Schedule*.

Rhet 3291. Independent Study. (1-3 cr [max 3 cr]. Prereq–#,Δ)
Supervised reading and research on topics not covered in regularly scheduled offerings. Intended primarily for upper division undergraduate students.

Rhet 3335. Rural and Urban Images in Film. (3 cr)
Country and city life as described in motion pictures, American and international. The "country mouse/city mouse" conflict from ancient literature to the present. Examine the rhetoric of film as an art form with its own criteria of excellence.

Rhet 3361. Literature of Social Movements in the United States: 1950 to 2000. (3 cr; A-F only)
Analysis of literature (fictional, nonfictional) of social movements in the United States in last half of 20th century. Artistic truth in relation to historical truth. Roles/obligations of citizens to protest/change social structures.

Rhet 3371. Technology, Self, and Society. (3 cr. Prereq–[Jr or sr] STC major or #)
Culture of technology. Social/personal meanings technology holds. Issues of power, work, identity, and our relation to nature. Mass production/consumption, industrialization of agriculture, changes in art/design, effects of modern transportation/communication technologies.

Rhet 3376. Terrorism. (3 cr)
Terrorism is not only an ethical but an international problem. Different cultures have meant different historical trajectories for terrorism. To illustrate this, the course contrasts Algerian, Irish, and Arab terrorism.

Rhet 3381. 20th-Century Culture. (3 cr)
Culture represented in historical/political events and arts of the period. Emphasis on European and American painting with units on architecture, literature, film, and theater, as well as a consideration of philosophy and ethics in other disciplines.

Rhet 3382. War. (3 cr)
Claim: If ethics (right/wrong) exist in war, then right/wrong exist everywhere. Students experience this claim through its expression in various arts/humanities media of history, memoir, philosophical meditation, and film.

Rhet 3383. In Search of Nature. (3 cr)
The human need for a relationship with nature and the ways we organize our environment to reflect this need. Various images such as the pastoral and wilderness are traced historically. Tensions between rural and urban views of nature.

Rhet 3384. Corn, Cows, and History: Role of Agriculture in Rise of Civilizations. (3 cr; A-F only)
Central importance of emergence of agriculture (i.e., domestication of plants/animals) in development of settled communities, cities, nations, and empires. How it happened, how we know. Differences among agricultural developments on different continents.

Rhet 3401. Internet Communication: Tools and Issues. (3 cr. Prereq–Internet access including e-mail, [Netscape 3.0 or higher or equiv])
Current/developing tools/issues of internet-based communication. E-mail, e-commerce, social/cultural context of communication. Discussion topics vary, depending on current issues in existing or emerging technologies. Active online participation required.

Rhet 3562. Technical and Professional Writing. (4 cr; A-F only. Prereq–[EngC 1011 or 1101 or 1152 or equiv], jr)
Written/oral communication in professional settings. Gathering information, analyzing audience, assessing conventional formats. Drafting, testing, revising documents. Oral presentation of final reports.

Rhet 3562W. Technical and Professional Writing. (4 cr; A-F only. Prereq–[EngC 1011 or 1101 or 1152 or equiv], jr)
Written/oral communication in professional settings. Gathering information, analyzing audience, assessing conventional formats. Drafting, testing, revising documents. Oral presentation of final reports.

Rhet 3577W. Rhetoric, Technology, and the Internet. (3 cr; A-F only. Prereq–[1101 or equiv], [3401 or equiv])
The Internet from a rhetorical perspective. How the Internet is changing language, power to persuade, scientific/technical knowledge, and legal issues such as copyright, privacy, and free speech. Emphasizes how scientific/technical information is conveyed on the Internet. Ethical issues specific to use of computers.

Rhet 3671. Project Design and Development I. (3 cr; A-F only. Prereq–[3562, STC major] or #)
Rhetorical principles applied to visual presentation of information/data in print documents. Students create examples of visual communication and design selected technical publications. Principles of technical writing.

Rhet 3672. Project Design and Development II. (3 cr; A-F only. Prereq–3671)
Students study, plan, research, design, and develop technical communication print documents, including documentation, brochures, and newsletters. Introduction to workplace project processes. Emphasizes developing production-quality documents.

Rhet 3701W. Rhetorical Theory and Scientific and Technical Communication. (4 cr. Prereq–EngC 1011 or 1101 or 1152 or equiv)
Principles/history of rhetorical theory/criticism. Emphasizes classical theories, especially "Aristotle's Rhetoric." Apply Aristotelian concepts to examples of contemporary communication. Relationship of classical theory to scientific discourse, technical communication.

Rhet 4105W. Corporate Video for Technical Communicators. (4 cr; A-F only. Prereq–3562 or equiv or #)
Introduction to products, professionals, and processes of corporate video. Students analyze corporate video; submit a proposal, treatment, and script; maintain a journal; complete an interactive unit on production; and conduct research on a video-related topic of their choice.

Rhet 4165. Managerial and Organizational Communication, Planning, and Change. (3 cr; A-F only. Prereq–3266 or #)
A study of organizational theory, communication processes, planning, and change with emphasis on action research in scientific and/or technical settings. Study of organization and management theory to develop organizational consultative skills.

Rhet 4196. Internship in Scientific and Technical Communication. (3-6 cr [max 6 cr]; S-N only. Prereq–STC major, #)
Internships sites may include the University, industry, or government agencies. An internship proposal, progress report, internship journal (optional), and final report with a letter from the internship supervisor is required.

Rhet 4501. Usability and Human Factors in Technical Communication. (3 cr. Prereq–Sr or grad student or #)
Principles/concepts of human factors/usability testing. Text-based, expert-based, reader-based, and prototype-based user testing. Developing objectives, criteria, and measures. Conducting tests in lab, field, and virtual environments. Using software programs to analyze qualitative/quantitative data.

Rhet 4561. Editing and Style for Technical Communicators. (3 cr. Prereq–[3562, [STC major or grad student]] or #)
Editorial process, levels of style, ethical considerations. Cohesion, clarity, coherence, organization, audience. Writer-editor relationship. Editor's marks. Copyright issues.

Rhet 4573. Writing Proposals and Grant Management. (3 cr; A-F only. Prereq–3562, undergrad)
Research funding sources. Interpreting an RFP or program announcement. Letters of intent. Grant preparation following guidelines of an RFP or program announcement. Proposals for nonprofits or research/business proposals. Using Microsoft Project.

Rhet 4662W. Emerging Technologies in Technical Communication. (4 cr; A-F only. Prereq–3562 or equiv)
Focuses on creating multimedia, hypertext, online help, and internet documents. Linear/nonlinear design, linking, reading/editing online. Principles of technical communication taught through projects: scripts, online support, mark-up language.

Rhet 4671. Principles and Application of Project Management and Design I. (3 cr; A-F only. Prereq–STC major or grad or #)
Two-semester sequence introduces design principles, visual display of data, and management of a variety of publications including newsletters, brochures, and scientific posters, as well as computer software programs to assist in these tasks.

Rhet 4672. Principles and Application of Project Management and Design II. (3 cr. Prereq–4671)
Two-semester sequence introduces design principles, visual display of data, and management of a variety of publications including newsletters, brochures, and scientific posters, as well as computer software programs to assist in these tasks.

Rhet 5111. Message Design: Theory and Practice I. (3 cr; A-F only. Prereq–Grad student or #)
Audience analysis, media selection, message design through various theoretical perspectives, including cognitive/schema, social construction, feminist, intercultural theories. Usability testing, contextual inquiry as means to study effectiveness of messages.

Rhet 5112. Message Design: Theory and Practice II. (3 cr; A-F only. Prereq–5111)
Political, economic, social, and technical aspects of media selection and message design. Media analyses, scripts, budgets, treatments, project-design plans, interactive screens. On-line design project.

Rhet 5196. Internship in Scientific and Technical Communication. (3-6 cr [max 6 cr]; S-N only. Prereq–STC grad or #)
Internship sites may include the University, industry, or government agencies. An internship proposal, progress report, internship journal (optional), and final report with a letter from the internship supervisor are required.

Rhet 5258. Information-Gathering Techniques in Scientific and Technical Communication. (3 cr; A-F only)
Informational, employment-cycle, and problem-solving interviews. Emphasizes guides, schedules, questioning techniques, and communication theories. Descriptive statistics used to analyze data for various projects.

Rhet 5270. Special Topics. (1-3 cr [max 3 cr]; A-F only. Prereq–[[STC or RSTC] [major or grad student]], #)
Topics specified in *Class Schedule*.

Rhet 5291. Independent Study. (1-3 cr [max 3 cr]. Prereq–#)
Supervised reading and research on advanced projects not covered in regularly scheduled offerings.

Rhet 5511. Research in Scientific and Technical Communication. (3 cr; A-F only)
Experimental/survey research techniques for quantitative/qualitative methodologies in scientific/technical communication. Face-to-face, phone, focus group interviewing. Questionnaire development, contextual inquiry. Using rating, ranking, q-sort methods. Ethics, experimental bias, inferential statistical analysis.

Rhet 5531. Scientific and Technical Communication Course Development and Pedagogy I. (3 cr; A-F only. Prereq–Grad)
Pedagogical philosophy/methodology in beginning writing, speaking, and technical communication class. Introduction to theories underlying teaching/tutoring with technology.

Rhet 5532. Scientific and Technical Communication Course Development and Pedagogy II. (3 cr; A-F only. Prereq–5531 or #)
Pedagogical philosophy/methodology in advanced writing, technical communication, distance education courses. Introduction to theories of teaching in scientific/technical communicating/teaching with multimedia.

Rhet 5533. Scientific and Technical Communication Course Development: Teaching Seminar. (1 cr; A-F only. Prereq–5531 or 5532)
Mentor with faculty, usually concurrently with student's first teaching assignment. Students shares observations, solves teaching problems in seminar setting. Issues facing new teachers, developing a philosophy of teaching. Focuses on evaluating work in classroom.

Rhet 5534. Designing Technical Training for Intercultural Audiences. (3 cr; A-F only)
Select and research a training topic, write learning objectives and outcomes, set the conditions for learning, complete a comprehensive course outline, and one training module.

Rhet 5562. Theory and Practice in International Business Communication. (3 cr; A-F only. Prereq–3562 or equiv)
Theories and practice in international and intercultural scientific, technical, and business communication. Examine cultural differences by studying cultural metaphors and research studies, by interviewing people from other cultures including international business managers, and through case studies.

Rhet 5664. Science Writing for Popular Audiences. (3 cr; A-F only. Prereq–3562 or #)
How science is "translated" for popular audiences. Rhetorical theory used to critique popularized articles. Developing a heuristic for writing articles. Controversial issues surrounding movement from science as "science" to science as "popular."

Rhet 5775. Major Figures in Rhetorical Tradition: Classical Period. (3 cr; A-F only)
Classical theories of rhetoric. Epistemological status of rhetoric. Ethical implications of persuasion. Emphasizes "Aristotle's Rhetoric" as founding document. Other figures (e.g., Plato, Isocrates, Cicero, Quintilian).

Rhet 5776. Major Figures in Rhetorical Tradition: Modern Era. (3 cr; A-F only)
Aristotelian rhetoric in modern era. Fancis Bacon, scientific revolution. George Campbell, rise of human sciences. Kenneth Burke, semiotics in twentieth century. Perelman/Olbrechts-Tyteca, reconciliation with philosophy.

Russian (Russ)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

Russ 1101. Beginning Russian I. (5 cr)
Listening, speaking, reading, writing.

Russ 1102. Beginning Russian II. (5 cr. Prereq–1101 or equiv)
Listening, speaking, reading, writing.

Russ 1304W. Introduction to Russian Literature: 19th-Century Fiction. (3 cr)
Introduction to the study of literature illustrated by materials drawn from Russian literature of the 19th century.

Russ 1905. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

Russ 3001. Intermediate Russian I. (5 cr. Prereq–1102 or equiv)
Conversation, composition, grammar review, translation, readings in literature.

Russ 3002. Intermediate Russian II. (5 cr. Prereq–3001 or equiv)
Expansion of experience in speaking, reading, and understanding Russian. Reading contemporary texts.

Russ 3101. Advanced Russian I. (4 cr. Prereq–3002 or equiv)
Advanced grammar, conversation, composition, and reading.

Russ 3102. Advanced Russian II. (4 cr. Prereq–3101 or equiv)
Advanced grammar, conversation, composition, and reading.

Russ 3104. Introduction to Literary Analysis. (3 cr. Prereq–3002 or equiv)
Reading and analysis of poetry and prose selections to understand rudiments of studying Russian literature. Readings are in Russian.

Russ 3105. Russian Poetry and Prose. (3 cr. Prereq–3002)
Appreciation of literary values through stylistic analysis and literary interpretation; analysis of humanistic elements. Readings in Russian.

Russ 3211. Modern Russian Literature in Translation. (3 cr. §5211)
Literary, cultural, and political significance of modern Russian literary works.

Russ 3311. Russian Major Project. (3 cr; A-F only. Prereq–Advanced Russian major)
Directed research and writing in student's chosen field.

Russ 3311H. Honors Major Project in Russian. (3-4 cr; A-F only. §3312, §3311. Prereq–Russ major, #)
Directed research/writing in student's chosen field.

Russ 3404. Tolstoy in Translation. (3 cr. §5404)
Novels, stories, and philosophical writings of Leo Tolstoy.

Russ 3407. Stories and Plays of Anton Chekhov in Translation. (3 cr. §5407)
Study of literary devices and themes in selected stories and major plays using the intrinsic approach.

Russ 3409. 19th-Century Russian Novel. (3 cr. §5409)
The Russian realistic novel from origin to decline. Social, political, and intellectual circumstances that led to its emergence as the dominant genre of the "age of realism" in Russia.

Russ 3411. Dostoevsky in Translation. (3 cr. §5411)
Novels, stories, and miscellaneous writings of Fyodor Dostoevsky.

Russ 3421. Literature: Middle Ages to Dostoevsky in Translation. (3 cr. §5421)
Russian literature from about 1000 A.D. to mid-19th century; emphasizing writers of the first half of the 19th century.

Russ 3422. Literature: Tolstoy to the Present in Translation. (3 cr. §5422)
Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

Russ 3512. Russian Art and Culture from Peter I to the Present. (3 cr)
Major trends in Russian visual arts discussed in the context of pertinent social, political, and ideological questions.

Russ 3601. Methods of Translating Fiction From Russian to English. (3 cr. §5601. Prereq–3102 or equiv)
Learning to appreciate a variety of literary styles through the experience of translation.

Russ 3900. Topics in Russian Language, Literature, and Culture. (1-4 cr [max 16 cr]. Prereq–1102 for language topics)
Variable topics in Russian language, literature and culture. Consult department for details.

Russ 3993. Directed Studies. (1-4 cr. Prereq–#, Δ, ❑)
Guided individual study.

Russ 5021. Russia Study Tour. (6 18 cr. Prereq–3002 or equiv)
Study of Russian language and culture in an accredited institution in Russia.

Russ 5104. Introduction to Literary Analysis. (3 cr. Prereq–3002 or equiv)
Reading and analysis of poetry and prose selections to understand rudiments of studying Russian literature. Readings are in Russian.

Russ 5105. Russian Poetry and Prose. (3 cr. Prereq–3002 or equiv)
Appreciation of literary values through stylistic analysis and literary interpretation; analysis of humanistic elements. Readings in Russian.

Russ 5211. Modern Russian Literature in Translation. (3 cr)
Literary, cultural, and political significance of modern Russian literary works.

Russ 5404. Tolstoy in Translation. (3 cr. §3404)
Novels, stories, and philosophical writings of Leo Tolstoy.

Russ 5407. Stories and Plays of Anton Chekhov in Translation. (3 cr. §3407)
Study of literary devices and themes in selected stories and major plays using the intrinsic approach.

Russ 5409. 19th-Century Russian Novel. (3 cr. §3409)
The Russian realistic novel from origin to decline; social, political, and intellectual circumstances that led to its emergence as the dominant genre of the "age of realism" in Russia.

Russ 5411. Dostoevsky in Translation. (3 cr. §3411)
Novels, stories, and other writings of Fyodor Dostoevsky.

Russ 5421. Literature: Middle Ages to Dostoevsky in Translation. (3 cr. §3421)
Russian literature from about 1000 A.D. to mid-19th century; emphasizing writers of the first half of the 19th century.

Russ 5422. Literature: Tolstoy to the Present in Translation. (3 cr. §3422)
Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

Russ 5601. Methods of Translating Fiction from Russian to English. (3 cr. §3601. Prereq–3102 or equiv)
Learning to appreciate a variety of literary styles through the experience of translation.

Russ 5900. Topics in Russian Language, Literature, and Culture. (1-4 cr. Prereq–1102 for language topics)
Variable topics in Russian language, literature, and culture.

Russ 5993. Directed Studies. (1-4 cr [max 16 cr]. Prereq–#, Δ, ❑)
Guided individual study.

Sanskrit (Skt)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Skt 5001. Beginning Sanskrit. (3 cr)
Introduction to the classical language of ancient India.

Skt 5002. Beginning Sanskrit. (3 cr. Prereq–5001 or equiv)
Introduction to the classical language of ancient India.

Skt 5201. Intermediate Sanskrit. (3 cr. Prereq–5002 or equiv)
Readings in Sanskrit literature.

Skt 5202. Intermediate Sanskrit. (3 cr)
Readings in Sanskrit literature.

Skt 5710. Topics: Language and Literature. (3 cr. Prereq–#)
Selected reading and/or study of linguistic problems in Sanskrit.

Skt 5992. Directed Readings. (3 cr. Prereq–5202 or equiv)
Guided individual reading or study.

Scandinavian (Scan)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

Scan 1101. Intensive Modern Icelandic. (6 cr. §4101. Prereq–Δ)
Basic listening, speaking, reading, writing. Everyday subjects (shopping, directions, family, food, housing). Culture/society. First half is at University of Minnesota-Twin Cities; second half is at University of Iceland-Reykjavik. Six-week course.

Scan 1909W. Topics: Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule.*

Scan 3012. Scandinavian Languages and Cultures in Contact. (4 cr. Prereq–Nor 3011 or Dan 3011 or Swed 3011)
Cultural/linguistic issues common to Denmark, Norway, Sweden. Conversation/composition in one Scandinavian language. Reading/listening in all three languages.

Scan 3501. Scandinavian Culture Past and Present. (3 cr)
Cultural, social, and political developments; principal views and core values; major cultural figures; Scandinavian mentality. Readings in translation for nonmajors. Invited lectures on central topics within selected areas of study.

Scan 3502. Scandinavian Myths. (3 cr)
Literary and cultural investigation of the popular beliefs, myths, and religion of the medieval Scandinavians; the interaction of paganism and Christianity; the reflection of myths in Old Scandinavian literature and art. All readings in English.

Scan 3503. Scandinavian Folklore. (3 cr)
Literary and folkloristic investigation of Scandinavian folktales and legends. Readings in translation for nonmajors.

Scan 3504. The Immigrant Experience. (3 cr)
Issues of origin and language, immigration and settlement, traditions and values, culture and politics, and transgressions of boundaries from the old to the new studied through photos, diaries, letters, stories, and novels by Moberg, Rølvaag, Ager, and other pioneers. All readings in translation.

Scan 3505. Scandinavian Fiction From 1890 to Present. (3 cr)
Modernity's search for new forms to represent changing historical situations. Ibsen, Strindberg, Hamsun, Selma Lagerlöf, Hjalmar Bergman, Pär Lagerkvist, Karen Blixen, Moa Martinson, Tarjei Vesaas, Edith Södergran, Ingmar Bergman, Lars Gustafsson. All readings in translation.

Scan 3601. Great Literary Works of Scandinavia. (3 cr)
Major literary works from the Middle Ages to the present. Readings in translation.

Scan 3602. The Literary Fairy Tale in Scandinavia. (3 cr)
Examples of literary fairytales from Scandinavia, especially Hans Christian Andersen. Readings in translation for non-majors.

Scan 3605. The Scandinavian Short Story. (3 cr)
Short stories by important 19th- and 20th-century authors from all the five Scandinavian countries. Genre theory and practical criticism. Readings in English for non-majors.

Scan 3606. The Expressionist Film in Scandinavia. (3 cr)
Study of the expressionist film in Scandinavia with emphasis on the work of Carl Dreyer and Ingmar Bergman. Expressionist film is placed in relation to other manifestations of Expressionism in Scandinavia, i.e., theater and painting. Readings in translation.

Scan 3611. Expressionism in Scandinavia. (3 cr)
Expressionism in literature and art, theater and film with emphasis on August Strindberg, Knut Hamsun, Hjalmar Bergman, Edvard Munch, Pär Lagerkvist, Edith Södergran, and Ingmar Bergman. All readings in translation.

Scan 3612. Images of Scandinavia in Art, Film, and Literature. (3 cr)
Images of Scandinavia(ns) in art, film, and literature by both Scandinavians and foreigners. Images of self-knowledge, self-revelation, and otherness. Representative photos and videos of people, locations, and styles. Readings in English.

Scan 3613. Children's Literature in Scandinavia. (3 cr)
Analysis and discussion of representative works in Scandinavian children's literature from picture books to young adult books using a variety of critical methods of interpretation. Taught in English.

Scan 3614. Crime in Scandinavian Fiction and Culture. (3 cr)
Scandinavian ideas of what constitutes crime, its causes, and its treatment. Detective stories, crime novels/films, crime in popular media. Readings in translation for non-majors; Scandinavian majors/minors read in their specific languages.

Scan 3618. Scandinavian Drama. (3 cr)
Study of representative plays by Henrik Ibsen, August Strindberg, Hjalmar Bergman, Pär Lagerkvist, Nordahl Grieg, Kjeld Abell, and Ingmar Bergman in the context of modern theater with emphasis on politics and society. All readings in translation.

Scan 3619. Travel in Literature. (3 cr)
Experiences in literature of Scandinavians going abroad, foreigners coming to Scandinavia. Culture/travel as self-knowledge, self-revelation, otherness. Slides/videos of travel destinations from literature. Readings in English.

Scan 3634. Scandinavian Women Writers. (3 cr)
Investigation of issues important to women as articulated by Scandinavian women writers. Historical overview of women's writing in Scandinavia and in-depth investigation of texts by contemporary women writers. All readings in translation.

Scan 3670. Topics in Scandinavian Studies. (3 cr [max 9 cr])
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in *Class Schedule.* Readings in English for nonmajors. May meet with 5670.

Scan 3993. Directed Studies. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading and study.

Scan 4001. Scandinavian Languages for Reading. (4 cr. Prereq–Passing score on GPT in a Scandinavian language or equiv)
Designed to help undergraduate and graduate students with knowledge of one Scandinavian language to develop reading competence in the other two. Students will get an introduction to the fundamental differences between Danish, Norwegian and Swedish through reading short texts in all three languages.

Scan 4101. Intensive Modern Icelandic. (3 cr. §1101. Prereq–Grad student, Δ)
Basic listening, speaking, reading, writing. Everyday subjects (shopping, directions, family, food, housing). Culture/society. First half is at University of Minnesota-Twin Cities; second half is at University of Iceland-Reykjavik. Six-week course. Meets with 1101.

Scan 4602. Fiction and Film. (3 cr)
Examines film adaptations of classical Scandinavian literary texts and explores similarities and differences between the viewer's and reader's experiences in the media of film, drama and epic narration. Includes works by Blixen, Hamsun, Ibsen, Strindberg, Axel, Bergman, Dreyer and Losey.

Scan 4614. Introduction to Kierkegaard. (3 cr)
The literary, philosophical, theological, and psychological dimensions of Kierkegaard's work. Kierkegaard's influence on 20th-century culture in general and existentialism in particular. Analysis and discussion of selections from Kierkegaard's entire oeuvre. Readings in English.

Scan 4615. The Family in Scandinavian Literature. (3 cr)
The family as theme in important works of Scandinavian literature from Middle Ages to the present. What does a family mean to its members and to society, and what is the cultural and critical significance of literature about the family? Analytical and historical approaches. Readings in English.

Scan 5202. Scandinavian Romanticism. (3 cr)
Study of Scandinavian literature (poetry, drama, and prose), 1800 -1870. Texts in the original languages.

Scan 5501. Scandinavian Mythology. (3 cr)
Study of Scandinavian mythology based on primary sources represented by Saxo Grammaticus, Snorri Sturluson's Edda and Ynglinga Saga, and the Poetic Edda. Myths are analyzed using contemporary critical approaches. All readings in translation.

Scan 5502. The Icelandic Saga. (3 cr)
Study of the sagas written in 13th-century Iceland. Discussion includes cultural and historical information about medieval Iceland and analysis of a selection of saga texts using contemporary critical approaches. All readings in translation.

Scan 5613. Contemporary Scandinavian Literature. (3 cr)
An investigation of issues which emerged as extremely important after 1945 in Scandinavia, as articulated by writers and analyzed by researchers in social sciences. All readings in translation.

Scan 5615. Ibsen and the Beginnings of Modern Drama. (3 cr)
Close reading of Ibsen's "modern tragedies" from *A Doll's House* (1879) to *When We Dead Awaken* (1899). Focus is on the dialectics between Ibsen and his society, and dramatic structure and staging conventions in the context of modern theater. Readings in English for nonmajors.

Scan 5616. Strindberg and the Drama in Revolt and Change. (3 cr)
Strindberg as the master of naturalistic drama and the precursor of modernity in European and American theater. Close reading of plays with emphasis on dramatic structure and staging conventions in the context of modern theater. All readings in English for nonmajors.

Scan 5670. Topics in Scandinavian Studies. (3 cr [max 9 cr])
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in *Class Schedule.* Readings in English for nonmajors. May meet with 3670.

Scan 5701. Old Norse Language and Literature. (3 cr)
Acquisition of a reading knowledge of Old Norse; linguistic, philological and literary study of Old Norse language and literature.

Scan 5702. Old Norse Saga Reading and Analysis. (3 cr. Prereq–5701 or equiv reading knowledge of Old Norse)
Reading and analysis of Old Norse prose narratives, including close reading and discussion of the critical literature about the prose narratives and medieval Icelandic culture. All primary texts read in Old Norse.

Scan 5703. Old Norse Poetry. (3 cr. Prereq–5701 or equiv reading knowledge of Old Norse)
Reading and analysis of either eddic poetry from the Poetic Edda or skaldic poetry. Texts read in Old Norse.

Scan 5704. History of the Scandinavian Languages. (3 cr)
Investigation of the development of the Scandinavian languages from the earliest periods to the present.

Scan 5711. Structure of the Scandinavian Languages. (3 cr. Prereq–introductory course in linguistics or #)
Investigation of the philological, grammatical, and lexical systems of the Scandinavian languages.

Scan 5993. Directed Studies. (1-4 cr [max 12 cr]. Prereq–#, Δ, ❑)
Guided individual reading and study.

Science in Agriculture (ScAg)

College of Agricultural, Food and Environmental Sciences

ScAg 1001. Orientation to Science in Agriculture. (1 cr; S-N only)
Discussion of the Science in Agriculture major, current issues, career planning, and professional development. Interviews with faculty and other resource persons.

ScAg 1501. Biotechnology, People, and the Environment. (3 cr; A-F only)
Basic concepts in genetic engineering as a foundation for studying the impact of biotechnology on agriculture, medicine, industry, and the environment. Controversial aspects of biotechnology related to public policy issues are discussed.

ScAg 4009W. Undergraduate Senior Thesis: Science in Agriculture. (1-6 cr [max 12 cr]; A-F only. Prereq–jr or sr major in ScAg, #)
Research and thesis experience conducted under supervision of a COAFES faculty member. Recommended course length is one full year. A written bound thesis and oral presentation of research results is required.

Slavic (Slav)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

Slav 5900. Topics in Slavic Languages and Literatures. (3 cr)
Topics specified in *Class Schedule.*

Social Work (SW)

School of Social Work

College of Human Ecology

SW 2001. Introduction to Social Welfare and Community Services. (4 cr)
History of American social services; rise of professional social work in response to human need. Social, political, and economic factors influencing public policy and services. Role of social workers with individuals, families, groups, and communities; values and ethics of professional helping role.

SW 3051. Ethno-cultural Concepts and Human Services. (3 cr)
Ethno-cultural concepts relevant to service delivery. Critically examine cross-ethnic issues and practice considerations in the field of human services, and explore issues which produce barriers to services for diverse racial and cultural client groups.

SW 3101. Interventions in Community and Social Policy. (3 cr)
Applying social work skills and values to community organization, social action, and social problems using an ecological framework.

SW 3203. Interventions with Individuals and Groups. (3 cr)
Using an ecological framework, apply social work skills and values to work with individuals and small groups.

SW 3402. Child Abuse and Neglect: Intervention and Prevention. (3 cr)
Interdisciplinary/comprehensive study of child maltreatment, family violence today. Prevalence, scope, dynamics. Response/preventative strategies for individual, familial, community analysis.

SW 3705. Gender Violence in Global Perspective. (3 cr)
Theories/research on violence in intimate domestic relationships examined through multiple lenses. Overview of interventions in Minnesota, United States, and other societies.

SW 3706. Family Violence and Prevention: Exploring the Issues. (3 cr)
Major issues related to child abuse, gender violence, elder abuse, and intergenerational issues of violence in families. Types of violence, issues unique to families. Dynamics, contributing factors, and types of interventions.

SW 4001. Basic Counseling and Interviewing Skills in the Social Work Helping Process. (1 cr; A-F only)
Development/maintenance of a social worker-client helping relationship. Professional values and ethics. Interviewing skills of active listening, empathy, and authenticity. Identifying purpose, roles, and responsibilities through asking questions, reflecting, and clarifying.

SW 4002. Advanced Counseling and Interviewing Skills in the Social Work Helping Process. (1 cr; A-F only. Prereq–4001 or #)
Builds on 4001. Focuses on assessment and on developing reasonable, measurable, and attainable goals. Working with involuntary clients, goal attainment strategies, evaluating progress, and ending.

SW 4693. Directed Studies. (1-10 cr [max 10 cr]. Prereq–#)
Guided individual reading or study related to social issues, social work methods, or social work history.

SW 4694. Directed Research. (1-10 cr [max 10 cr]. Prereq–#)
Guided research related to social issues, social work methods, or social work history.

SW 5051. Human Behavior and the Social Environment. (2-3 cr; A-F only. Prereq–Grad student or 8 cr social sciences or #)
Social, psychological, biological, and cultural factors of individual and group development as applied to social work practice. Behavior and life-cycle development focusing on diversity and each stage of life. Discuss development in terms of the individual, and in terms of overlapping social systems such as the multigenerational family, culture, community, and society.

SW 5052. Ecologies of Child Development Within Communities of Color. (3 cr. Prereq–Grad or #)
Examine social, affective, and cognitive development of children of color via a life course, ecological systems framework. Family, school, peers, and community are studied as ecological contexts which influence developmental trajectories for these children and youth. Attention is given to poverty, racism, and oppression.

SW 5101. Historical Origins and Contemporary Policies and Programs in Social Welfare. (3-4 cr; A-F only. Prereq–Grad or 8 sem cr of social sciences)
Contemporary policies and programs in social welfare are examined in light of their historical origins and evolution. A framework is then developed for analysis of concepts and principles in contemporary social policy for social welfare programs and services. The emergence of the profession of social work also examined.

SW 5105. Women and Public Policy. (3 cr)
Study of feminist organizations; issues and conflicts within organizations and movements; methods and sources for studying feminism.

SW 5107. Child Development and Social Policy. (3 cr. Prereq–Grad or #)
Examine the intersection of conceptual orientations of developmental psychology with policies that affect children and families. Demographic, historic, and social trends underlying the assumptions that drive policies directed at women and children; projections of future policies.

SW 5309. Case Management with Special Populations. (3 cr. Prereq–Grad or adult special or #)
Examine concepts and principles of case management practice with special populations such as older adults, persons with developmental disabilities, and persons with serious and persistent mental illness. The core functions of case management practice in a range of settings are addressed in relationship to issues of diversity, vulnerability, and empowerment.

SW 5313. Social Work with Older Adults. (2 cr. Prereq–Grad or adult special or #)
The practice components of social work with older adults including assessment, intervention, and case management. Taught from the perspective of bio-psycho-social strengths and challenges and within the context of current social policy and delivery systems.

SW 5314. Social Work in the Schools. (2 cr. Prereq–Grad or adult special or #)
Application of social work methods in a school setting. Emphasizes assessment, diagnosis, consultation, advocacy, interdisciplinary team building, and crisis intervention.

SW 5315. Social Work Practice in Hospitals and Health Care Settings. (2 cr. Prereq–Grad or adult special or #)
Prepares students for social work practice in a hospital or health care setting. Focus on integration of conceptual and practice subject matter that covers differential assessment, clinical intervention models, impact of acute and chronic illness, special populations, managed care, legal and ethical issues, interdisciplinary team work, and transition planning in health care.

SW 5316. Brief Treatment and the Task-Centered Approach. (2 cr. §8303. Prereq–Grad or adult special or #)
The advent and current prominence of brief treatment models in work with individuals, families, and groups including their theoretical and empirical bases. Practice with diverse populations in a context of managed care. Emphasis on the task-centered approach including skill training and supervised practice.

SW 5317. Social Work With Involuntary Clients. (2 cr. Prereq–Grad or adult special or #)
Includes theory, ethics, effectiveness, and intervention methods for work with client systems that experience involuntary contact with a social worker. Interventions at micro, mezzo, and macro levels are included. Practice in varied settings such as child welfare, mental health, corrections, and public schools as well as practice related to organizational responses to change.

SW 5318. Family Centered Home Based Services. (2 cr. §8314. Prereq–Grad or adult special or #)
Ecological, multisystems approach focusing on the family system. Triadic theory, meta-neutrality, strengths-focus, case management and team treatment. Family-based services evaluated for high-risk, multi-problem families and as an alternative to foster placement.

SW 5319. Adolescents: Norms, Culture, and Health. (2 cr)
Relationships among familial, social, societal, political, economic, environmental, psychosocial, and cultural determinants of adolescent behavior that affect health; major public health issues and problems of adolescents.

SW 5481. Child Abuse Prevention I: Research and Theory. (3 cr. Prereq–Bachelor's degree or #)
Foundation of research/theory for level I child abuse prevention studies certificate.

SW 5482. Child Abuse Prevention II: Program Development, Evaluation, and Advocacy. (3 cr. Prereq–5481)
Design and evaluation of policies and programs of interventions to prevent child abuse. This is the second course in the Level I Child Abuse Certificate program.

SW 5483. Child Abuse Prevention III: Skill Building I—Cultural and Legal Issues. (3 cr. Prereq–Bachelor's degree or #)
Risk factors, protective factors, resilience in cultural settings. Identifying/designing strategies appropriate to cultural characteristics. First course for level II child abuse prevention certification.

SW 5484. Child Abuse Prevention IV: Skill Building II—Risk Assessment and Interviewing. (3 cr. Prereq–Bachelor's degree or #)
Designing instruments for child abuse risk assessment. Culturally/ethnically competent interviewing. Ethnographic interviewing. Strengths-based ecosystemic assessment. Strategies for evaluating interventions. Second course for level II child abuse prevention certification.

SW 5519. Mediation and Conflict Resolution. (3 cr. §8519)
Develop mediator skills for making informed decisions regarding the appropriateness of mediation for conflicts that frequently confront social worker practitioners such as divorce, neighborhood disputes, conflicts between parents and adolescents, conflicts between spouses, and conflicts between crime victims and offenders.

SW 5525. Global Perspectives on Social Welfare, Peace, and Justice. (3 cr. Prereq–2001 or #)
Role of international social welfare in meeting basic human needs and promoting human rights, social justice, and peace. Theories, models, and social policies in different economic and political systems with emphasis on Third World nations.

SW 5705. Violence in Families. (3 cr. §5707. Prereq–Grad student or adult special or #)
Prevention/intervention with perpetrators, survivors, and social institutions. Perpetration, effects on victims, social responses to family violence. Child abuse/neglect. Abuse of women/vulnerable adults. Roles of gender, race, culture, age, physical ability, and sexual orientation.

SW 5706. Issues and Interventions in Child Sexual Abuse. (2 cr. Prereq–Grad student or adult special or #)
Major issues/interventions in child sexual abuse. Working with sexually abused children and their families. Perceptions of victims, non-offending parents, perpetrators, and other family members. Interviewing. Justice system. Child protection.

SW 5707. Interventions with Battered Women and Their Families. (2 cr. §5705. Prereq–Grad or adult special or #)
Current theories, research, and evaluation of interventions with battered women and their families. Focus on practice, e.g., direct work with social institutions, victim-survivors, and assailants and their families.

SW 5708. Substance Abuse and Social Work. (3 cr. Prereq–Grad or adult special or #)
Assessment and intervention in situations involving substance abuse with special emphasis on cross cultural practice. Relationships of substance abuse to areas such as child welfare, mental illness, and violence within families are examined.

SW 5709. Applied Psychopharmacology for Human Service Professionals. (2 cr; A-F only)
Categories of psychoactive drugs. Medications to treat mental disorders. Legal drugs such as alcohol, nicotine, cocaine, and marijuana. What is occurring physiologically when someone takes a psychoactive drug.

SW 5810. Seminar: Special Topics. (1-4 cr)
Topics specified in *Class Schedule*.

SW 5811. Social Work Ethics. (2 cr. §8801. Prereq–Grad student or adult special or #)
Acquire knowledge base and develop skills required to identify ethical issues, resolve ethical dilemmas, and make ethical decisions within the context of the professional practice of social work. Values base and ethical standards of the profession and ethical decision-making models examined in-depth.

SW 5813. Child Welfare and the Law. (2 cr. Prereq–2nd yr MSW or advanced standing or #)
Social work practice in juvenile court. Child abuse/neglect reporting laws, risk assessment, reasonable efforts, case plan, custody proceedings, permanency planning, termination of parental rights, child testimony, social worker testimony, adoption laws.

SW 5991. Independent Study in Social Work. (1-4 cr [max 4 cr])
Independent study in areas of special interest to students and faculty.

Sociology (Soc)

Department of Sociology

College of Liberal Arts

Soc 1001. Introduction to Sociology. (4 cr. §1011V, §1012W)
Scientific study of human societies/behavior. Major theories, methods, concepts, research findings. Characteristics of basic social units, their patterns of interrelation, processes of change.

Soc 1011V. Honors: Introduction to Sociology. (4 cr. §1001, §1012W. Prereq–Honors)
Scientific study of human societies/behavior. Major theories, methods, concepts, research findings. Characteristics of basic social units, their patterns of interrelation, processes of change.

Soc 1090. Topics in Sociology. (1-3 cr. Prereq–#)
For freshmen. Topics specified in *Class Schedule*.

Soc 1091. Independent Study. (1-4 cr. Prereq–#)
Independent study of an established 1xxx course. Available only by request.

Soc 3003. Social Problems. (3 cr; A-F only. Prereq–1001 or #)
Analysis of major social problems including, inequality, crime, drug abuse, pollution, racism, among others. Examination of proposed solutions and evaluation of policy consequences.

Soc 3090. Topics in Sociology. (1-3 cr. Prereq–#)
For sophomores. Topics specified in *Class Schedule*.

Soc 3091. Independent Study. (1-4 cr. Prereq–#)
Independent study of an established 3xxx course. Available only by request.

Soc 3093. Directed Study. (1-4 cr. Prereq–1001, #, Δ, ❑)
Guided individual reading or study at the sophomore level.

Soc 3094. Directed Research. (1-4 cr. Prereq–1001, #)
Guided research experience at the sophomore level.

Soc 3101. Introduction to the American Criminal Justice System. (3 cr; A-F only)

Soc 3102. Introduction to Criminal Behavior and Social Control. (3 cr; A-F only)
Issues in science of crime as a social phenomenon. Creation/use of laws, patterns/causes of crime.

Soc 3201. Inequality: Introduction to Stratification. (3 cr; A-F only. Prereq–1001 or equiv)
Causes, dimensions, and consequences of inequality in American society; class, gender, race. Power and status differentials. Cross-national patterns of inequality. Social mobility. Education and occupational influences. Status attainment. Social stratification and change. Social welfare. Public policies affecting inequality.

Soc 3211W. American Race Relations. (3 cr; A-F only)
Surveys conceptual and theoretical tools sociologists use to study race relations in the United States. Empirical focus on the historical experiences among different racial/ethnic groups in the United States including, American Indians, African-Americans, Latinos, Asian-Americans, and white ethnics.

Soc 3221. Sociology of Gender. (3 cr; A-F only. §WoSt 3201. Prereq–1001 or #)
Organization, culture, and dynamics of gender relations as major features of social life. Gender and racial inequalities in the workplace, relationships between gender and race, gender and culture, sexuality, gendered politics, and the women's movement.

Soc 3251W. Sociological Perspectives on Race, Class, and Gender. (3 cr; A-F only)
Race, class, and gender as aspects of social identity and as features of social organization. Experiences of women of color in the United States; exploration of family life, work, violence, sexuality and reproduction, and the possibilities for social change.

Soc 3301W. The Uses of Citizenship: An Introduction to Political Sociology. (3 cr; A-F only. Prereq–1001 or #)
The ideas of citizenship and the relationship between politics and society; public sphere and civil society. Research practicum volunteering at a policy-relevant site using participant observation methods.

Soc 3322. Social Movements. (3 cr; A-F only. Prereq–1001 or #)
Origins, dynamics, and consequences of social movements. Challenges facing movement organizations. Relationship between movements and political institutions. Role of movements in bringing about social change. Organized around theoretical issues, draws on wide variety of case studies.

Soc 3351W. Politics and Society in the New Europe. (3 cr. §Pol 3451. Prereq–1001 or Pol 3051 or #)
Generational change/values, political parties, welfare state, future of European integration, political stability/democratization.

Soc 3411W. Understanding Formal Organizations. (3 cr; A-F only. Prereq–1001 or #)
Formal organizations as major social influences in our work lives, personality development, social change, and conflict. Life-course analysis of enterprises, bureaucracies, and voluntary organizations. Organizational control, conflict, coordination, and interorganizational sets and relationships.

Soc 3415. Sociology of Consumer Behavior. (3 cr; A-F only. Prereq–1001 or #)
Behaviors related to symbolic value of material goods: how symbols are created, acquired, diffused, and used for organizing personal identity and for maintaining group boundaries. Fashion. Socialization. Structure of retail trade. Role of mass media, advertising, marketing/production strategies. Implications of world-wide markets for manufacturing goods and selling them in retail stores. Readings, classroom discussions, lectures.

Soc 3451W. Urban Community. (3 cr. Prereq–1001 or #)
Social, economic, and political organization of the urban community focusing on racial inequality/segregation, urban enclaves, social reproduction, and civic participation of elites and residents. Cross-national comparisons, including United States, Europe, and East Asia.

Soc 3452. Education and Society. (3 cr; A-F only)
Introduction to sociological theories/research about education in modern societies. Effects of education on beliefs/values. Effects of school characteristics on student achievement and educational attainment. Education and inequality. Cross-national differences in educational systems. Link between education and national economic performance. Organizational characteristics of schooling. Prospects for school reform.

Soc 3501. Sociology of the Family. (3 cr. Prereq–1001 or #)
Families in contemporary American society; historical and cross-cultural comparisons; interrelationships of families with other social institutions; race, class, and gender in shaping family experiences. Topics may include marriage, divorce, childbearing, parenthood, family violence, gay and lesbian families.

Soc 3511. World Population Problems. (3 cr. Prereq–1001 or #)
Population growth and natural resources, fertility and mortality in less developed nations, population dynamics and forecasts, policies to reduce fertility.

Soc 3661. Japanese Society Today. (3 cr; A-F only. §EAS 3661. Prereq–1001 or courses on or exper in East Asia or #)
Forms of social relations and values, religion, childhood, family, community, education, work, business organization, politics, social classes, crime and deviance, police, popular culture, status of women and minorities, social protest movements, and international relations.

Soc 3671. Contemporary Chinese Society: Mainland China, Hong Kong, Taiwan. (3 cr; A-F only. §EAS 3671, §Geog 3671. Prereq–1001 or Geog 1301 or equiv social sciences or humanities course or #)
Focuses on post-1949 mainland China, Taiwan, and Hong Kong. Chinese family, dating and marriage, rural and urban societies, population, work and occupation, socioeconomic development and inequalities, and impacts of post-1978 reforms.

Soc 3701. Social Theory. (4 cr; A-F only. Prereq–1001 or #)
Traditions of social theory that have been basic to sociological knowledge, how they have expanded in contemporary theory, and their applications in selected areas of empirical research.

Soc 3711. Principles of Social Organization. (3 cr; A-F only. Prereq–1001 or equiv)
How and why social organization is possible. Concepts and theories of social structure, primary forms of social organization (groups, communities, networks, formal organizations), basic social processes (integration, differentiation, regulation, change), and how social organization evolves from individual decision making.

Soc 3721. Principles of Social Psychology. (3 cr. Prereq–1001 or #)
Impact of social location on individual attitudes and behaviors, dynamics of interpersonal relationships and small groups, and processes of social interaction.

Soc 3801. Sociological Research Methods. (4 cr. Prereq–[1001, Soc major] or #)
Principles/practice of research design, sampling, data collection including field observation/surveys. Data management, analysis, and reporting of quantitative/nonquantitative data. Ethics/administration in sociological research. Lab.

Soc 3811. Basic Social Statistics. (4 cr. Prereq–GC 0731 or intermediate algebra; 3801 recommended)
Descriptive statistics. Measures of central tendency, deviation, association. Inferential statistics focusing on probability and hypothesis testing. T-tests, Chi-square tests, variance analysis, bivariate regression. Statistical software used to analyze sociological data.

Soc 3821. Computer Use for Social Statistics. (1 cr; S-N only. Prereq–¶3811 recommended)
Elementary computer use in social statistics applications. Use of Statistical Package for Social Sciences (SPSS) for preparing and analyzing sociological data.

Soc 3991H. Junior Honors Seminar. (3 cr; A-F only. Prereq–Jr soc honors student)
Read and discuss sociological research literature; explore research funding opportunities; design individual research projects.

Soc 4090. Topics in Sociology. (1-3 cr. Prereq–#)
Topics specified in *Class Schedule*.

Soc 4091. Independent Study. (1-4 cr. Prereq–#)
Independent study of an established 4xxx course. Available only by request.

Soc 4093. Directed Study. (1-4 cr. Prereq–#, Δ, ❑)
Guided individual reading or study at the junior/senior level.

Soc 4094. Directed Research. (1-4 cr. Prereq–#)
Guided research experience at the junior/senior level.

Soc 4101W. Sociology of Law. (3 cr; A-F only. Prereq–[1001, 3101, 3102, 3111] or #; 3701 recommended)
Sociological analysis of law/society. Why people obey the law, social forces involved in creating law (both civil and criminal), procedures of enforcement, impact of law on social change.

Soc 4102. Criminology. (3 cr; A-F only. Prereq–[3101, 3102, 3111] or #)
Nature/types of crime. Problems in measuring incidence/trends. Review of sociological theories of crime causation. Implications for crime prevention/control.

Soc 4105. Sociology of Punishment and Corrections. (3 cr; A-F only. Prereq–[3101, 3102, 3111] or #)
Advanced study of correctional strategies such as prison, probation, and parole. Theories/structures of diversion, probation, parole, and other community corrections programs. U.S. penal policies/practices compared with those in other countries.

Soc 4107. Comparative Law and Social Control. (3 cr; A-F only. Prereq–[3101, 3102, 3111] or #)
Sociological analysis of legal systems in different countries. Relationship between legal systems and society. Cross-national variation in crime rates, criminal justice systems, legal doctrine, litigation, and lawyers.

Soc 4108. Current Issues in Crime Control. (3 cr. Prereq–[3101, 3102, 3111] or #)
Selected current criminal justice policies examined from perspective of courts, legislature, community, and interest groups. Impact of criminal justice policy changes on society and on social control agencies.

Soc 4109. Domestic Criminal Violence. (3 cr. Prereq–[3101, 3102, 3111] or #)
Survey of research on family violence within criminological framework. Definition of domestic violence. Empirical/theoretical approaches. Response of social control agencies.

Soc 4111. Deviant Behavior. (3 cr; A-F only. Prereq–[3101, 3102, 3111] or #)
Definition/nature of deviant behavior. Social processes associated with deviant careers and social reintegration. Relationship of deviant behavior to social control.

Soc 4114. The Social Control of Women Offenders. (3 cr. Prereq–[3101, 3102, 3111] or #)
Historical/current explanations for female criminality. Current trends in women's participation in crime and their treatment in the legal system.

Soc 4125. Policing American Society. (3 cr; A-F only. Prereq–[3101, 3102, 3111] or #; [4161, 4162] recommended)
Police organizations/operations from social science perspective. Formal/informal policing: role/functions, legal bases, accountability/restraints, community relations, use of force, illegal practices.

Soc 4135. Sociology of White-Collar Crime. (3 cr; S-N only. Prereq–[3101, 3102, 3111] or #)
Causes/consequences of white-collar crime. Control issues, including public perception, legislation, criminal law responses (enforcement, sentencing, punishment), and alternative control mechanisms.

Soc 4141. Juvenile Delinquency. (3 cr; A-F only. Prereq–[3101, 3102, 3111] or #)
Childhood and delinquency. Measuring extent/distribution of delinquent behavior. Applying theories to relationships within family, school, and peer group. Institutional responses to delinquency. Evaluating programs for treatment, prevention, and control.

Soc 4142. Juvenile Justice and Law. (3 cr. Prereq–[3111, [sr or grad student]] or #; grad students may register S-N)
Evolution of juvenile court. Organizational relationships among court, police, and other agencies. Policies regarding serious/status offenders. Intake, diversion, pretrial detention, waiver to adult court, sentencing. Conflicts over due process and treatment objectives. Current movements to abolish juvenile justice system.

Soc 4147. Sociology of Mental Illness. (3 cr. Prereq–[1001, 3101, 3102, 3111] or #)
Sociological theory/research related to definitions/origins. Epidemiology, reaction patterns, use of mental health services.

Soc 4148. Criminal Psychopathology. (3 cr. Prereq–Sr or grad; only grad may take S/N)
Psychiatric and psychological aspects of antisocial and criminal behavior as related to issues faced in the courts and criminal justice system.

Soc 4149. Killing. (3 cr. Prereq–Sr or grad; only grad may take S/N)
Sociological, legal, and psychological aspects of diverse types of killing. The topic of "normal" killings is contrasted with various pathological types. Subtopics include: mentally disturbed killings, sexual killings, killings within families, gang killings, and terrorist killings.

Soc 4161. Criminal Law in American Society. (3 cr. Prereq–[3101, 3102, 3111] or #)
Purposes of criminal law and of principles of criminal liability, justification, and excuse. Applications to law of criminal homicide, sexual assault, drugs, and crimes against property, public order, and morals.

Soc 4162. Criminal Procedure in American Society. (3 cr. Prereq–[3101, 3102, 3111] or #)
How a constitutional democracy balances need to enforce criminal law and rights of individuals to be free of unnecessary government intrusion.

Soc 4170. International Law and Cultural Change. (3 cr; A-F only. Prereq–[1001, 3101, 3102] or #)
In a globalized world, which cultural values/practices take precedence? Which are criticized, altered, eliminated? What role does international law play in these processes? Immigration, terrorism, Americanization, structure of international legal system.

Soc 4175. Law, Politics, and Inequality. (3 cr; A-F only. Prereq–[1001, 3101, 3102] or #)
Critically evaluates law as a resource that defines, reinforces, and alters social relationships. Connection between law and justice. Law seen from perspective of class, race, or gender.

Soc 4305. Society and the Environment: A Growing Conflict. (3 cr; A-F only. Prereq–1001 or environmental course or #)
Societal causes and cures of ecological problems such as global warming, species extinction, and resource exhaustion.

Soc 4321. Sociology of Globalization: Culture, Norms, and Organization. (3 cr; A-F only. Prereq–1001 or #)
Globalization of organizations, political relations, and culture. Dependency and world systems theories. Growth of international nongovernmental organizations and their impact on state policies and civil society. Expansion of international norms governing nation-state behavior. Globalization of popular culture (e.g., movies, computer games). Effects on societies/individuals.

Soc 4441. Work-Family Links. (3 cr. Prereq–1001 or #)
Effects of spouses' work experiences on the family, organization of household work, adolescent employment, occupational attainment; and changes in work organizations related to the increasing prevalence of female employment and dual-earner families.

Soc 4461. Sociology of Ethnic and Racial Conflict. (3 cr; A-F only. Prereq–1001 or #)
Effects of ethnic migration and of social movements. Construction of ethnic/national identities. Questions of citizenship. Rise of transnational movements, how they help shape racial/ethnic conflicts.

Soc 4601. Comparative Social Structure. (3 cr; A-F only. Prereq–1001 or #)
Comparative analysis of selected societies. Application of comparative methods to explain differences, similarities in social structure, development, trends. Topics include, social class, status, political economy, policies, social movements, ethic identities, multicultures, demography. Methods include network models, Boolean analysis.

Soc 4662. Comparative East Asian Development: A New Model for Growth and Prosperity?. (3 cr; A-F only. §EAS 4662. Prereq–3661 or Soc 3661 or related Asian or sociology courses or East Asian experience or #)
Social and cultural reasons for the rapid growth and relative equity of Japan, South Korea, Taiwan, Hong Kong, Singapore, and more recently, China. Relation of these examples to more general theories of development.

Soc 4681. Sociology of German Society. (3 cr; A-F only. Prereq–1001 or #)
The making of German society; institutions in cross-national comparison (including family, education, welfare state, social movements, law); and current issues of German society.

Soc 4703. Social Theory and Cultural Change. (3 cr; A-F only. Prereq–1001 or #)
Key changes in cultural life in the United States and internationally, and theories that have been developed to understand them. Topics may include work, family, social movements, media and popular culture, and politics.

Soc 4821. Computer Methods in Social Research. (3 cr. Prereq–3801 or equiv recommended)
Computer applications in social science research. Hands-on practice using and evaluating software for conducting research; using the Internet; automated surveys; transforming and analyzing numeric, textual, and graphical data; using simulations and other computer models.

Soc 4966W. Major-Project Seminar. (4 cr; A-F only. Prereq–3701, 3801, 3811, 12 cr upper div sociology, Δ)
Defining research problem. Collecting/selecting data. Analyzing data. Writing report.

Soc 4967W. Advanced Senior Project Independent Study. (1 cr; A-F only. Prereq–3701, 3801, 3811, 12 additional upper div sociology cr, Δ)
Guided individual research for the sociology major's senior project requirement, conducted in conjunction with enrollment in an upper division sociology course.

Soc 4977V. Senior Honors Proseminar I. (3 cr; A-F only. 4977-4978†. Prereq–Sr soc honors major, 3701, 3801, 3811, 9 additional upper div sociology cr, Δ)
Exploring contemporary research for senior thesis. Guidance in defining a problem and reviewing prior theory and research. Presentation and discussion with faculty researchers.

Soc 4978V. Senior Honors Proseminar II. (3 cr; A-F only. Prereq–4977V or #; Δ; sr soc honors major, 3701, 3801, 3811, 9 additional upper division sociology cr, Δ)
Developing the methodology of the senior project, researching it, and writing the thesis. Students work individually or in small groups in consultation with seminar director and other faculty. Group discussion of individual projects.

Soc 5090. Topics in Sociology. (1-3 cr. Prereq–1001 or #)
Topics specified in *Class Schedule*.

Soc 5091. Independent Study. (1-4 cr. Prereq–#)
Independent study of an established 5xxx course.

Soc 5301W. Social Movements. (3 cr. Prereq–# for undergrads; 3301 or #)
Origins, dynamics, and consequences of social movements. Dilemmas and challenges facing movement organizations. Relationship among movements, parties, and states and role of movements in bringing about change. Case studies of civil rights, labor, environmental, women's, gay rights, and student movements.

Soc 5455. Sociology of Education. (3 cr. Prereq–1001 or equiv or #)
Structures and processes within educational institutions. Links between educational organizations and their social contexts, particularly as these relate to educational change.

Soc 5811. Intermediate Social Statistics. (4 cr. Prereq–3811 or equiv)
Measurement, theory of probability, and bivariate statistics. Focus on multiple regression analyses of sociological data. Primarily for first-year sociology graduate students who need preparation for advanced social statistics. Undergraduates preparing for graduate programs may register upon availability.

Soil (Soil)

Department of Soil, Water, and Climate

College of Agricultural, Food and Environmental Sciences

Soil 1125. The Soil Resource. (4 cr)
Basic physical, chemical, and biological properties of soil. Soil genesis classification and principles of soil fertility. Soil survey information used to make a land-use plan. WWW used for lab.

Soil 1425. Introduction to Meteorology. (3 cr. §Geog 1425)
Pre-calculus introduction to nature of atmosphere, its behavior. Atmospheric composition, structure, stability, motion. Precipitation processes, air masses, fronts, cyclones/anticyclones. General weather patterns. Meteorological instruments/observation. Weather map analysis. Weather forecasting.

Soil 1426W. Introduction to Meteorology Laboratory. (2 cr. §Geog 1426)
Lab offered with 1425. Weather observation, meteorological instrumentation. Statistical analysis of weather observations, climatological data. Map analysis, weather forecasting.

Soil 2125. Basic Soil Science. (4 cr [max 4 cr]. §1125. Prereq–Chem 1011 or Chem 1021 or equiv)
Basic physical, chemical, and biological properties of soil. Soil genesis classification, principles of soil fertility. Use of soil survey information to make a land-use plan. WWW used for lab preparation information.

Soil 3221. Soil Conservation and Water Quality Impacts. (3 cr. Prereq–1125 or 2125 or #)
Soil conservation and water quality impacts of soil erosion, including nutrient transport to surface waters. Causes/consequences of soil erosion. Physical processes of wind/water erosion. Soil conservation techniques for agriculture, forestry, mining, and urban land uses. Economic, political, and sociological influences on soil conservation. Strategies for reducing nutrient losses to surface waters.

Soil 3416. Plant Nutrients in the Environment. (3 cr. Prereq–2125)
Fundamental concepts in soil fertility and plant nutrition. Discuss dynamics of mineral elements in soil, plants, and the environment. Evaluation, interpretation, and correction of plant nutrient problems.

Soil 3521. Soil Judging. (1 cr [max 3 cr]. Prereq–4511)
Learn about collegiate soil judging by participating in a regional or national soil judging contest.

Soil 3612W. Soil and Environmental Biology. (3 cr. Prereq–2125 recommended, Biol 1009 or equiv, Chem 1021 or equiv)
Properties of microorganisms that impact soil fertility, structure, and quality. Nutrient requirements of microbes and plants, and mineral transformations in biogeochemical cycling. Symbiotic plant/microbe associations and their role in sustainable agricultural production. Biodegradation of pollutants and bioremediation approaches.

Soil 4021W. Environmental Impact Statements. (3 cr. Prereq–AgEc 4611 or #, jr or sr, 16 cr of science)
Roles of governmental agencies, consultants, and private citizens in the EIS process. Students will read EIS, EAW and analyze their content and scope, and prepare an EAW according to Minnesota EQB guidelines and an EIS on a local project.

Soil 4093. Directed Study. (1-7 cr [max 20 cr]. Prereq–#)
Research, readings, and instruction.

Soil 4094. Directed Research. (1-7 cr [max 7 cr]. Prereq–#)
Research under the direction of department faculty.

Soil 4111. Introduction to Precision Agriculture. (3-5 cr; A-F only. §MAST 2420. Prereq–Basic sciences, statistics, soil, agronomy)
Soil, landscape, and crop spatial variability. GIS, DEM, GPS technologies. Variable rate machinery, PA software, remote sensing. Geostatistics, sampling, experimental designs. Precision integrated crop management. Data acquisition, processing, and management. Socio-economical and e-marketing aspects.

Soil 4121. Microbial Ecology and Applied Microbiology. (3 cr; A-F only. Prereq–3612, Biol 3301 or MicB 3301)
Interrelationship of microorganisms with terrestrial, aquatic, and organismal environments; survey of bacterial, fungal, and algal components of ecosystems; evolution and structure of microbial communities; population interactions within ecosystems; quantitative and habitat ecology; biogeochemical cycling; and biotechnological approaches to study of microbial ecology; molecular microbial ecology; gene transfer in the environment. Molecular phylogeny of microorganisms.

Soil 4216. Contaminant Hydrology. (2 cr)
Principles of contaminant transport in percolate solution and in overland flow. Hydrologic cycle, percolation/runoff processes, contaminant transport, leachate sampling methods, remediation technologies, scale effects on runoff water quality, tillage technologies, control of sediment/chemical losses. Discussions mostly descriptive, but involve some computations.

Soil 4511. Field Study of Soils. (2 cr. Prereq–2125)
Learn to write soil profile descriptions in the field. Class requires hands-on experience to determine soil texture, color, and horizon designations in the field.

Soil 4601. Soils and Pollution. (3 cr. Prereq–[2125, [Chem 1021 or equiv], [Phys 1042 or equiv]] or #; 3416 recommended)
Principles of microbiology, chemistry, physics applied to evaluation of pollution of soils. Mitigation of pollution in agricultural/urban settings, remediation of polluted sites.

Soil 5111. Practicum Internship in Precision Agriculture. (2-5 cr; S-N only. Prereq–#)
Practical experience in precision agriculture in agri-industry/business. Content and extent of work at the internship site is jointly decided by the instructor, host business representative, and student's principal adviser.

Soil 5125. Soil Science for Teachers. (3 cr)
Basic physical, chemical, and biological properties of soil. Soil genesis classification and principles of soil fertility. WWW used for lab. Soil survey information used to make a land-use plan. Similar to 2125 with less emphasis on chemistry.

Soil 5211. Environmental Biophysics and Ecology. (2 cr; A-F only. Prereq–[[Biol 1009 or equiv], Math 1271, Phys 1101, [upper div or grad student]] or #)
Basic concepts of environmental variables such as temperature, humidity, wind, and radiation. Mechanics of heat/mass transfer between a living organism and its surrounding environment. Set of practical examples to integrate concepts and transport processes.

Soil 5212. Environmental Biophysics and Ecology Laboratory. (1 cr; A-F only. Prereq–Biol 1009, Math 1271, Math 1282, Phys 1101)
Introduces experimental techniques in environmental biophysics and ecological studies. Measuring biophysical parameters of plants, animals, and their surrounding environments. Defining/describing physical status of a living organism, determining the rate of mass/energy exchange.

Soil 5232. Vadose Zone Hydrology. (3 cr. Prereq–[Math 1271 or equiv], [Phys 1042 or equiv])
Basic soil physical properties/processes governing transport of mass/energy in soils. Emphasizes water/solute transport through unsaturated root/vadose zones, their impact on subsurface hydrology and on water quality. Lectures, hands-on laboratory exercises, discussion of real world problems, problem solving.

Soil 5311. Soil Chemistry and Mineralogy. (3 cr. Prereq–[[Chem 1022 or equiv], Phys 1102, grad] or #)
Structural chemistry, origin/identification of crystalline soil clay minerals. Structure of soil organic matter. Chemical processes in soil: solubility, adsorption/desorption, ion exchange, oxidation/reduction, acidity, alkalinity. Solution of problems related to environmental degradation, plant nutrition, and soil genesis.

Soil 5312. Soil Chemistry and Mineralogy Laboratory. (2 cr. Prereq–¶5311 recommended)
Companion laboratory 5311. Clay mineral preparation for x-ray diffraction, selective mineral dissolution, cation exchange properties, absorption and solubility reactions and their modeling, carbonate equilibria, and organic matter extraction and identification.

Soil 5402. The Atmospheric Boundary Layer. (3 cr. Prereq–Math 1271, Phys 1201, Stat 3011)
Calculus-based introduction to the atmospheric boundary layer (ABL), the interface between the earth's surface and the atmosphere. Topics include ABL development and turbulence, surface energy balance, ABL clouds, air quality, microclimate, and observational and modeling methods.

Soil 5421. Introduction to Atmospheric Science. (3 cr [max 3 cr]. Prereq–Math 1271, Phys 1201, Stat 3011)
Calculus-based, introductory description of the atmosphere including atmospheric dynamics, radiation, thermodynamics, chemical composition, and cloud processes. Discuss applications to climate, meteorology, the hydrologic cycle, air quality, and biogeochemical cycles.

Soil 5515. Soil Genesis and Landscape Relations. (3 cr. Prereq–2125 or #)
Basic soil morphology and soil profile descriptions; pedogenic processes and models of soil development; soil geomorphology, hydrology, and hillslope processes; digital spatial analysis; soil classification; soil surveys and land use; soil geography.

Soil 5532. Soil Morphology and Mapping. (2 cr; A-F only. Prereq–2125)
Soil genesis, landscape interpretation, soil mapping. Describing soil properties. Creating mapping legends by sampling. Landscape interpretation for describing soil variability. Geographic information systems. Interpretation of aerial photography and topographic maps. Students delineate hillslope/geomorphic elements and prepare a soil map. Involves full days working in field, physical exertion.

Soil 5555. Wetland Soils. (2-3 cr; A-F only. Prereq–1125 or 2125 or equiv or #; ¶4511 recommended)
Morphology, chemistry, hydrology, formation of mineral/organic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands. Wetland benefits, preservation, regulation, mitigation. Field trips, lab, field hydric soil delineation project.

Soil 5601. Principles of Waste Management. (3 cr; A-F only. Prereq–1125 or 2125, Biol 1002/1009 or Chem 1021, Stat 3011, ApEc 1101 or #)
Waste and waste management principles. Issues, problems, and solutions in remedying waste stream. MSW and yard waste composting, WTE incineration operation, ash disposal, recycling, land fill requirements, direct land disposal, regulatory trends, and case studies.

Soil 5611. Soil Biology and Fertility. (3 cr. Prereq–2125, Biol 1009 or equiv, Chem 1021 or equiv, sr or grad, BioC 3xxx, MicB 3xxx recommended)
Soil microbial populations and biodiversity. Soil microorganisms. Biogeochemical cycles. Macro and micronutrient fertilization, and element function in plants and microbes. Composts, sludge and manures in fertilization. Plant microbe associations: nitrogen fixation, mycorrhizal fungi, and biological control of root pathogens. Pollution and bioremediation.

Soil 5711. Forest Soils. (2 cr. Prereq–1125 or 2125)
Factors affecting tree growth; estimation, modification, and management effects on site productivity; regeneration.

South Asian Languages and Cultures (SALC)

Department of Asian Languages and Literatures
College of Liberal Arts

SALC 1506. Introduction to Contemporary South Asia. (3 cr)
Land, people, modern historical development, contemporary problems, global setting, and future outlook of South Asia.

SALC 1607. Introduction to Indian Civilization. (3 cr)
Indian civilization in light of its development. Social, cultural, economic, and political life. Hindu, Muslim, and Buddhist contributions.

SALC 3201. Ancient Indian Literature in Translation. (3 cr)
Literary achievements of Indian civilization from the ancient period.

SALC 3202. Modern Indian Literature in Translation. (3 cr)
Literary achievements of Indian civilization from the modern period.

SALC 3204. Folklore of India. (3 cr)
A study of the main genres of Indian folklore: folk tales, folk songs, folk epics, folk dramas, proverbs, and riddles; their relationship to Indian society and inter-relationship with literary traditions, both great and small.

SALC 3411. Introduction to Indian Philosophy. (3 cr)
Major concepts; principal schools of Indian philosophy; traditional and contemporary views.

SALC 3412. Hinduism. (3 cr)
Development of Hinduism focusing on sectarian trends, modern religious practices, myths and rituals, pilgrimage patterns and religious festivals, and the interrelationship between Indian social structure and Hinduism.

SALC 3413. Buddhism. (3 cr)
Historical account of Buddhist religion in terms of its rise, development, various schools, and common philosophical concept. Indian Buddhism, compared with Hinduism; Buddhism's demise and revival on the Indian subcontinent.

SALC 3414. Comparative Religions of South Asia. (3 cr)
Compares and contrasts basic philosophical concepts, literatures, ideologies, and ritualistic practices of Hinduism, Buddhism, and Jainism with those of Islam and Sikhism.

SALC 3456. The Cinema of India. (3 cr)
Survey of cinema of South Asia; aesthetic, social, economic, and political perspectives.

SALC 3506. Introduction to Contemporary South Asia. (3 cr)
Land, people, modern historical development, contemporary problems, global setting, and future outlook of South Asia.

SALC 3521. Gandhi and Non-Violent Revolution. (3 cr)
Character of Gandhi, his influence over contemporaries, and his hold on the world today.

SALC 3556. Women in India: Role and Repression. (3 cr)
Representation of Indian women studied through literature of contemporary Indian women and against background of traditional Indian values and roles.

SALC 3607. Introduction to Indian Civilization. (3 cr)
Indian civilization in light of its development. Social, cultural, economic, and political life. Hindu, Muslim, and Buddhist contributions.

SALC 5011. Indo-Aryan Linguistics. (3 cr)
Phonological, morphological, and syntactic developments; Indo-European, Old Indo-Aryan, Middle Indo-Aryan, Hindi, and other major modern Indo-Aryan languages.

SALC 5090. Instruction in South Asian Languages. (3-5 cr)
Individualized instruction in one of the South Asian languages.

SALC 5201. Ancient Indian Literature in Translation. (3 cr)
Literary achievements of Indian civilization from the ancient period.

SALC 5202. Modern Indian Literature in Translation. (3 cr)
Literary achievements of Indian civilization from the modern period.

SALC 5204. Folklore of India. (3 cr)
A study of the main genres of Indian folklore—folk tales, folk songs, folk epics, folk dramas, proverbs, and riddles—their relationship to Indian society and inter-relationship with literary traditions, both great and small.

SALC 5411. Introduction to Indian Philosophy. (3 cr)
Major concepts; principal schools of Indian philosophy; traditional and contemporary views.

SALC 5412. Hinduism. (3 cr)
Development of Hinduism focusing on sectarian trends, modern religious practices, myths and rituals, pilgrimage patterns and religious festivals, and the interrelationship between Indian social structure and Hinduism.

SALC 5413. Buddhism. (3 cr)
Historical account of Buddhist religion in terms of its rise, development, various schools, and common philosophical concept. Indian Buddhism compared with Hinduism; Buddhism's demise and revival on the Indian subcontinent.

SALC 5414. Comparative Religions of South Asia. (3 cr)
Compares and contrasts basic philosophical concepts, literatures, ideologies, and ritualistic practices of Hinduism, Buddhism, and Jainism with those of Islam and Sikhism.

SALC 5456. The Cinema of India. (3 cr)
Survey of cinema of South Asia; aesthetic, social, economic, and political perspectives.

SALC 5500. Problems in Indian Philosophy. (3 cr. Prereq–3411 or 3412 or 3413 or 5411 or 5412 or 5413)
An introduction to Indian philosophy emphasizing analyses of mind and knowledge.

SALC 5521. Gandhi and Non-Violent Revolution. (3 cr)
Character of Gandhi, his influence over contemporaries, and his hold on the world today.

SALC 5556. Women in India: Role and Repression. (3 cr)
Representation of Indian women studied through literature of contemporary Indian women and against background of traditional Indian values and roles.

SALC 5710. Seminar in South Asian Languages. (4-5 cr)
Selected topics on South Asian languages; no knowledge of South Asian languages required.

SALC 5720. Seminar in South Asian Literature. (4-5 cr)
Selected topics on South Asian literature.

SALC 5730. Seminar in South Asian Culture. (4-5 cr)
Selected topics on South Asian cultures.

SALC 5833. India's Gods and Goddesses. (3 cr)
Indian history examined by following development of the deities Krishna, Shiva, and Kali.

SALC 5993. Directed Studies. (1-5 cr. Prereq–#, Δ, ❑)
Guided individual reading and study of topics not covered in regular courses. Open to qualified students for one or more semesters.

SALC 5994. Directed Research. (1-5 cr. Prereq–#, Δ, ❑)
Directed research on topics of language, literature, or civilization selected by qualified students with consent of instructor and studied on tutorial basis.

Spanish (Span)

Department of Spanish and Portuguese Studies
College of Liberal Arts

Span 0144. Intermediate Medical Spanish. (0 cr. Prereq–1st yr college level Spanish or equiv)
Vocabulary of Spanish medical terms, skills in report writing, proper format for medical communications. Developing conversational fluency for medical-related topics.

Span 0221. Reading Spanish. (0 cr; S-N only)
Intensive reading of a variety of texts to provide a basic reading knowledge of Spanish. At the end of the semester students may take the equivalent of the Spanish Graduate Reading Examination.

Span 1001. Beginning Spanish. (5 cr. Prereq–Less than 2 yrs of high school Spanish, Δ)
Basic listening, speaking, reading, writing skills. Emphasizes development of communicative competence. Some cultural readings.

Span 1002. Beginning Spanish. (5 cr. Prereq–1001 completed at UMNTC, Δ)
Listening, speaking, reading, writing. Emphasizes development of communicative competence. Cultural readings.

Span 1003. Intermediate Spanish. (5 cr. Prereq–[1002 or 1022] or entrance proficiency test)
Speaking/comprehension. Developing reading/writing skills based on materials from Spain/Spanish America. Grammar review. Compositions, oral presentations.

Span 1004. Intermediate Spanish. (5 cr. Prereq–1003 or entrance proficiency test or [#, Δ])
Speaking/comprehension. Developing reading/writing skills based on materials from Spain/Spanish America. Grammar review. Compositions, oral presentations.

Span 1014. Business Spanish. (4 cr. Prereq–1003 or [#, Δ])
Vocabulary, report writing skills, proper format for business communications, conversational fluency on trade-related topics.

Span 1022. Alternate Second-Semester Spanish. (5 cr. Prereq–Placement above 1001)
For students who have studied Spanish in high school or at a community college, or who are transfer students. Begins with an accelerated review of 1001 followed by material covered in 1002.

Span 1041. Beginning Medical Spanish. (4 cr; A-F only)
Practical Spanish terminology, functional grammar, conversational fluency on medical-related topics.

Span 1044. Intermediate Medical Spanish. (4 cr; A-F only. Prereq–1003 or equiv)
Vocabulary of Spanish medical terms, skills in report writing, proper format for medical communications. Developing conversational fluency for medical-related topics.

Span 1902. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule*.

Span 1907W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule*.

Span 3015. Spanish Composition and Communication. (4 cr. Prereq–[1004 or 1014], GPT high pass)
Comprehending written/spoken texts. Speaking, reading, writing beyond intermediate level.

Span 3021. Advanced Communication Skills. (4 cr. Prereq–3015 or [#, Δ])
Improving language skills for fluency/accuracy in Spanish.

Span 3022. Advanced Business Spanish. (4 cr. Prereq–[1014 or 1004 or equiv], GPT in Spanish)
Vocabulary of Spanish business terms, Skills in report writing, proper format for business/formal communications. Developing conversational fluency on trade-related topics.

Span 3104W. Analysis and Interpretation of Texts. (3 cr; A-F only. Prereq–[3015, GPT high pass] or [#, Δ])
Various ways of understanding structure of diverse texts, interpreting their meaning.

Span 3105W. Introduction to the Study of Hispanic Civilizations. (3 cr. Prereq–[3015, GPT high pass] or [#, Δ])
Cultural issues generated by integration of Americas into emerging world system via Spanish/Portuguese empires.

Span 3107W. Introduction to the Study of Hispanic Linguistics. (3 cr. Prereq–[3015, GPT high pass] or [#, Δ])
Phonology, morphology, syntax, semantics, lexicology, pragmatics, discourse analysis, sociolinguistics, history of Spanish language. Hispanic linguistics as theoretical discipline. Its relationships with social, cultural, literary studies.

Span 3211. Literary Discourses of Imperial Spain, 1492-1800. (3 cr. §3211H. Prereq–3104)
Major literary genres of Spain (epic, lyric, narrative, dramas, novels, essays) from Middle Ages/Golden Age to Enlightenment. Representative works (ballads, picaresque "vidas," tragedies, mystical verse, novellas) examined within historical/cultural contexts.

Span 3211H. Honors: Literary Discourses of Imperial Spain, 1492-1800. (3 cr; A-F only. §3211. Prereq–3104, honors)
Major Spanish literary genres (epic, lyric, narrative prose, drama, novel, essay) from Middle Ages and Golden Age to the Enlightenment. Representative works (ballads, picaresque "vidas," tragedies, mystical verse, novellas) examined within historical and cultural contexts.

Span 3212. Literary Discourses of Modern and Contemporary Spain (1800-Present). (3 cr. Prereq–3104)
Representative works of fiction, drama, poetry, essay, and film of the past two centuries. Intellectual and literary movements from romanticism to postmodernism.

Span 3212H. Honors: Literary Discourses of Modern and Contemporary Spain (1800-Present). (3 cr; A-F only. Prereq–3104, honors)
Representative works of fiction, drama, poetry, essay, and film of past two centuries. Intellectual/literary movements from romanticism to postmodernism.

Span 3221. Latin American Colonial Discourses Since 1492. (3 cr. §3221H or §3421. Prereq–3104 or 3105)
Critical account of conquest, colonization, and resistance in Spanish America.

Span 3221H. Honors: Latin American Colonial Discourses Since 1492. (3 cr. Prereq–[3104 or 3105], honors)
Critical account of conquest, colonization, and resistance in Spanish America.

Span 3222. Discourses of Nation Building and Modernization in Latin America. (3 cr. §3422. Prereq–3104 or 3105 or #)
Development of Spanish American modernity, its literary expression since independence from colonial rule. Case studies (e.g., Cuba).

Span 3222H. Honors: Discourses of Nation Building and Modernization in Latin America. (3 cr; A-F only. Prereq–[3105, honors] or #)
Development of modernity in Spanish America, its literary expression since independence from colonial rule. Case studies (e.g., Cuba).

Span 3401. Service Learning in the Chicano/Latino Community. (3 cr. Prereq–3015, GPT)
Students participate in Spanish-speaking community organizations; analyze academic materials dealing with race, class, gender, and current patterns of power in the United States, roles of citizens within system; and relate this to their community experience.

Span 3501. Spanish Civilization: Roots of Modern Spain and Latin America. (3 cr. §3411, §3501H. Prereq–3105)
Customs, lifestyles, art, and culture from coexistence of Christians, Moors, and Arabs during reconquest to national unification. Discoveries/conquests up to "modern state" and political crises of early 19th century.

Span 3501H. Honors: Spanish Civilization, Roots of Modern Spain and Latin America. (3 cr; A-F only. §3411, §3501. Prereq–3105, Honors)
Customs, lifestyles, art, and culture from coexistence of Christians, Moors, and Arabs during reconquest to national unification. Discoveries/conquests up to "modern state" and political crises of early 19th century.

Span 3502. Spanish Civilization: Modern Spain. (3 cr. Prereq–3105)
Spanish culture from the beginning of the 19th century to the present. Focus on cultural change and its conflicts as represented in Spanish art, literature, and film.

Span 3502H. Honors: Spanish Civilization - Modern Spain. (3 cr; A-F only. Prereq–3105, honors)
Spanish culture from beginning of 19th century to present. Focus on cultural change and its conflicts as represented in Spanish art, literature, and film.

Span 3510. Issues in Hispanic Cultures. (2-3 cr [max 9 cr]; A-F only. Prereq–3105 or [#, Δ])
Practices that have shaped cultural identity of Spanish-/Portuguese-speaking areas. Folklore, religion, armed conflict, drug traffic, language/citizenship, political movements, commodification of national myths/icons. Topics vary.

Span 3510H. Honors: Issues in Hispanic Cultures. (2-3 cr [max 9 cr]; A-F only. Prereq–[3510, honors] or [#, Δ])
Practices that have shaped cultural identity of Spanish-/Portuguese-speaking areas. Folklore, religion, armed conflict, drug traffic, language/citizenship, political movements, commodification of national myths/icons. Topics vary.

Span 3512. Modern Latin American Civilization. (3 cr; A-F only. §3412, §3512H)
Impact of various forms of modernization on symbolic production in Latin American racial, ethnic, class relations, institutional, and ideological structures.

Span 3512H. Honors: Modern Latin American Civilization. (3 cr; A-F only. §3412, §3512. Prereq–3105)
Effect of various forms of modernization on symbolic production in Latin American racial, ethnic, class relations, institutional, and ideological structure.

Span 3601. A Social History of Marginals and Social Offenders. (3 cr)
Social history of deviance using a series of first-person narratives by Hispanic authors who lived "marginal" lives and wrote about them. Taught in English.

Span 3606. Human Rights Issues in the Americas. (3 cr. Prereq–Non-Span [major or minor]; taught in English)
Cultural/symbolic implications of selected human rights issues involving inter-American relations.

Span 3609. Commodities and National Myths. (3 cr)
Influence on Latin American national identities of selected commodities produced for the world market. Taught in English.

Span 3612. The *Man of La Mancha* and Quixotic Discourse. (3 cr)
Narrative techniques and points of view in [Don Quixote]; historical, cultural, and intellectual conditions under which the novel was read and debated. Taught in English.

Span 3653. Contemporary Latino and Latin American Drama Written in English. (3 cr)
Established works and works-in-progress of the most active Latino playwrights in the United States and historical, political, and cultural developments that make them possible. Lectures, discussion, performances, and visual material. Taught in English.

Span 3701. The Structure of Spanish: Phonology. (3 cr. §3701H. Prereq–3107)
Phonetics and phonology of modern Spanish. Regional and social variants of the language in Spain and Spanish America.

Span 3701H. Honors: Structure of Spanish—Phonology. (3 cr; A-F only. §3701. Prereq–3107, honors)
Phonetics/phonology of modern Spanish. Regional/social variants of the language in Spain and Spanish America.

Span 3702. The Structure of Spanish: Morphology and Syntax. (3 cr. Prereq–3107 or #)
Derivational and inflectional morphology. Using linguistic concepts such as morpheme, flexional affix, noun phrase, subject, subordination, and coordination to identify the different morphological and syntactic components of Spanish.

Span 3702H. Honors: Structure of Spanish—Morphology and Syntax. (3 cr; A-F only. Prereq–[3107 or #], honors)
Derivational/inflectional morphology. Using morpheme, flexional affix, noun phrase, subject, subordination, and coordination to identify different morphological/syntactic components of Spanish.

Span 3703. Origins and History of Spanish and Portuguese. (3 cr. Prereq–3107 or #)
Relationships with Latin; intermediate stages of evolution not considered. Phonetic, morphological, syntactic, and sociolinguistic aspects of diachronic variation.

Span 3703H. Honors: Origins and History of Spanish and Portuguese. (3 cr; A-F only. Prereq–[3107 or #], honors)
Relationships with Latin. Phonetic, morphological, syntactic, and sociolinguistic aspects of diachronic variation.

Span 3704. Sociolinguistics of the Spanish-Speaking World. (3 cr. Prereq–3107)
Social variants of Spanish dialects, Spanish in contact with other languages, bilingualism, language attitudes, pragmatic analysis of Spanish. Impact of recent cultural, political, and socioeconomic transformations on language.

Span 3704H. Honors: Sociolinguistics of Spanish-Speaking World. (3 cr; A-F only. Prereq–3107, honors)
Social variants of Spanish dialects. Spanish in contact with other languages. Bilingualism. Language attitudes. Pragmatic analysis of Spanish. Effect of recent cultural, political, and socioeconomic transformations on language.

Span 3705. The Semantics and Pragmatics of Spanish. (3 cr. Prereq–3107)
Sense relations. Semantics and grammar in Spanish. Theme, rhyme, and focus. The Spanish lexicon. Context, style, and culture. Communicative competence. Speech acts in Spanish.

Span 3705H. Honors: The Semantics and Pragmatics of Spanish. (3 cr; A-F only. Prereq–3107, honors)
Sense relations. Spanish semantics/grammar. Theme, rhyme, focus. Spanish lexicon. Context, style, culture. Communicative competence. Speech acts in Spanish.

Span 3730. Topics in Hispanic Linguistics. (3 cr [max 9 cr]; A-F only. Prereq–3107 or [#, Δ])
Topics specified in *Class Schedule*.

Span 3730H. Honors: Topics in Hispanic Linguistics. (3 cr; A-F only. Prereq–[3107 or #], honors)
Topics specified in *Class Schedule*.

Span 3800. Film Studies in Spanish. (2-3 cr [max 9 cr]; A-F only. Prereq–3104 or 3105 or [Δ, #])
Films from Spanish-speaking worlds in their historical, (geo)political, and socio-economic contexts. Production/consumption, popular/high cultures, and national/trans-national identities within various theoretical backgrounds. Films from various countries analyzed under interdisciplinary framework noting cinematographical rhetorics.

Span 3800H. Honors: Film Studies in Spanish. (2-3 cr [max 9 cr]; A-F only. Prereq–3104 or 3105 or [Δ, #])
Films from Spanish-speaking worlds in their historical, (geo)political, and socio-economic contexts. Production/consumption, popular/high cultures, and national/trans-national identities considered within various theoretical backgrounds. Films from various countries analyzed under interdisciplinary framework noting cinematographical rhetorics.

Span 3910. Topics in Spanish Peninsular Literature. (3 cr [max 9 cr]; A-F only. Prereq–3104 or [#, Δ])
Focus on a central theme related to important groups of writers, literary movements, trends, critical approaches, and methods. Topics specified in *Class Schedule*.

Span 3910H. Honors: Topics in Spanish Peninsular Literature. (3 cr; A-F only. Prereq–[3104, honors] or [#, Δ])
Focus on theme related to important groups of writers, literary movements, trends, critical approaches, and methods. Topics specified in *Class Schedule*.

Span 3920. Topics in Spanish-American Literature. (3 cr [max 9 cr]; A-F only. Prereq–3104 or Δ)
Central theme related to important groups of writers, literary movements, trends, critical approaches, and methods. Topics specified in *Class Schedule*.

Span 3920H. Honors: Topics in Spanish-American Literature. (3 cr [max 9 cr]; A-F only. Prereq–[3104 or Δ], honors)
Central theme related to important groups of writers, literary movements, trends, critical approaches, and methods. Topics specified in *Class Schedule*.

Span 3940. Figures in Spanish Peninsular Literature. (3 cr [max 9 cr]. §3340, §3940H. Prereq–3104 or #)
Major writer or group of writers whose work has had an impact on Spanish thought or literature or analysis of social patterns. Figures specified in *Class Schedule*.

Span 3940H. Honors: Figures in Spanish Peninsular Literature. (3 cr [max 9 cr]; A-F only. Prereq–Span 3104 or # and Honors status)
Major writer or group of writers whose work has had an effect on Spanish thought, literature, or analysis of social patterns. Figures specified in *Class Schedule*.

Span 3950. Figures in Spanish American Literature. (3 cr [max 9 cr]; A-F only. Prereq–3104 or Δ)
One major writer or group of writers whose work has had an impact on thought, literature, or social problems. Figures are specified in *Class Schedule*.

Span 3950H. Honors: Figures in Spanish-American Literature. (3 cr [max 9 cr]; A-F only. Prereq–[3104 or Δ], honors)
One major writer or group of writers whose work has affected thought, literature, or social problems. Figures specified in *Class Schedule*.

Span 3970. Directed Studies. (1-4 cr [max 9 cr]. Prereq–#, Δ, ❑)
Guided individual reading or study in Hispanic linguistics, language acquisition, cultural studies, and peninsular, Latin American, and U.S. Latino theatre and literatures.

Span 3972V. Honors: Graduation Seminar. (3 cr; A-F only. §3972W, §3974. Prereq–31 cr of 3xxx, honors, Δ)
Work on major project about Hispanic linguistics, language acquisition, or cultural studies, or about peninsular or Latin American or U.S. Latino theatre/literatures.

Span 3972W. Graduation Seminar. (3 cr; A-F only. §3972V, §3974. Prereq–31 cr of 3xxx, #)
Work on major project about Hispanic linguistics. Language acquisition. Cultural studies. Peninsular, Latin American, U.S. Latino theatre/literatures.

Span 5012. Advanced Problems in the Spanish Language. (.2 cr; A-F only)
Development of oral proficiency in Spanish. Participants choose section of course based on their current ACTFL level of Spanish language proficiency. Problematic aspects of Spanish pronunciation, grammar, idiomatic expressions reviewed according to needs of class participants.

Span 5106. The Literature of the Reconquest and Feudal Spain. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish)
The major literary genres developed in Spain from the Reconquest to 1502, with reference to the crucial transformations of the Middle Ages, including primitive lyric, epic, clerical narrative, storytelling, debates, collections, chronicles, "exempla," and the Celestina (1499-1502).

Span 5107. The Literature of the Spanish Empire and Its Decline. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)
Major Renaissance and Baroque works of the Spanish Golden Age (16th- and 17th-century poetry, nonfiction prose, novel, drama) examined against the historical background of internal economic decline, national crisis, and ideological apparatus developed by the modern state.

Span 5108. Don Quixote. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)
Analysis of Cervantes' *Don Quixote* in its sociohistorical context; focus on the novel's reception from the romantic period to postmodern times.

Span 5109. The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or #)
Major literary works and intellectual movements and conflicts represented in written culture, of the 18th and early 19th centuries (1680-1845), examined as expressions of the long crisis of Spain's Old Regime and the rise of bourgeois liberalism.

Span 5110. Discursive Formations at the Threshold of 20th-Century Spain. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or #)
Theory and representative examples of the realist/naturalist novel (Galdós, Pardo Bazán) in the context of its antecedents ("costumbrismo"), opposites (the idealist/sentimental novel), and turn-of-the-century innovations of modernism and the "generation of 1898."

Span 5111. Contemporary Spanish Literature Since 1915. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or #)
Major literary works and movements in Spain from 1915 to 2000. Neomodernism; surrealism; social realism; literatures of dictatorship and exile; postmodernism. Poetry, novel, drama, essays, film, video/TV; problems of literary history.

Span 5221. Spanish Drama in Performance: 17th-Century Comedia. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)
Major dramatists of the Spanish comedia (e.g., Cervantes, Lope, Tirso, Calderón). Traditional genres such as tragedy, farce, interludes or auto sacramentales and problems of honor, blood purity, free will, city vs. country, and poetic justice examined against the background of cultural and social history.

Span 5234. Feminism and Literature in Spain. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese or #)
Spanish feminist thought and practice; literature, cultural discourse, literary and critical theory.

Span 5272. Hispanic Modernism. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)
Critique of artistic and literary production in Hispanic cultures from mid-19th century to present. Modernity and modernization in Hispanic world. "Generation of 1898." Castilian, Catalán, and Latin American practices along interdisciplinary and comparative lines.

Span 5316. Spanish Picaresque Narratives. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)
Major picaresque narratives—*Lazarillo*, *Guzmán*, *Buscón*, Cervantes' *Picaros*, *Estebanillo González*—in relation to Spanish ambience, Western tradition, European novel, realism. Literary autobiography, episodic structure, themes of roguery, delinquency, sin, marginality, social criticism, moral preoccupations. Comparison to European counterparts.

Span 5525. Caribbean Literature: An Integral Approach. (3 cr. Prereq–Three [3xxx or 5xxx] literature courses in Spanish or #)
Literature of Spanish-speaking Caribbean. Emphasizes historical legacy of slavery, African culture, and independence struggles.

Span 5526. Creole Consciousness and Mercantilist Culture. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish)
Discourse production in Spanish America between 1492 and 1700. Conquest and colonial writing and counterwriting; historical origin and evolution and the impact of cultural, political, and socioeconomic factors.

Span 5527. National Literary Consciousness and Free Trade. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish)
Literary movements as part of the process of forming nation-states in Spanish America.

Span 5528. Popular Literary Consciousness: 1900-1950. (3 cr. Prereq–Three 3xxx or 5xxx lit courses in Spanish or Portuguese or Δ)
Spanish-American literature between the eve and aftermath of the two world wars. Impact of modernization, industrialization, and nationalistic and populist thought on emergence of distinctive writing, thematic trends, and literary genre conventions.

Span 5529. National Affirmation and Transnationalization. (3 cr. Prereq–Three 3xxx or 5xxx literature courses in Spanish or #)
Literary trends of the contemporary period (1950 to present) as a reaction to internal social demands for development of independent national cultures and in response to international cultural pressures.

Span 5531. Hispanic Literature of the United States. (3 cr. Prereq–Three 3xxx or 5xxx Spanish or Portuguese literature courses or #)
Interdisciplinary approach providing a framework for deconstructing issues of national identity, marginalization, and gender. U.S. Hispanic theatre/literature and its ethnic diversity, regional variations, cultural links, and scope of its genres.

Span 5532. Literature and National Disintegration. (3 cr)
Literary reaction to contemporary structural changes in world economic system (1970 to present). Effects on literature as institution. Texts related to revolutionary trends and social movements (feminism, theology of liberation, defense of human rights).

Span 5536. Feminism and Literature in Latin America. (3 cr. Prereq–Three 3xxx or 5xxx lit courses in Spanish or Portuguese or Δ)
Latin American feminism in thought and practice; literature, cultural discourse, literary theory.

Span 5701. History of Ibero-Romance. (3 cr. Prereq–3703, two other 3xxx or 5xxx Spanish linguistics courses or #)
Origins and developments of Ibero-Romance languages; evolution of Spanish, Portuguese, and Catalan.

Span 5711. The Structure of Modern Spanish: Phonology. (3 cr. Prereq–3701, two 3xxx or 5xxx linguistics courses in Spanish or #)
Formulating and evaluating a phonological description of Spanish. Approaches to problems in Spanish phonology within metrical, autosegmental, and lexical phonological theories.

Span 5712. The Structure of Modern Spanish: Morphology. (3 cr. Prereq–#)
Evaluating morphological theories and descriptions of Spanish. Examining of phonological and syntactic effects on morphology.

Span 5713. The Structure of Modern Spanish: Syntax. (3 cr. Prereq–3702, two 3xxx or 5xxx Spanish linguistics courses or #)
Study and analysis of the principal constructions found in the syntax of Spanish.

Span 5714. Theoretical Foundations of Spanish Syntax. (3 cr. Prereq–5713 or #)
Linguistic types/processes that appear across languages. Grammatical relations, word order, transitivity, subordination, information structure, grammaticalization. How these are present in syntax of Spanish.

Span 5715. The Structure of Modern Spanish: Semantics. (3 cr. Prereq–#)
Applying semantic theory to Spanish: conceptual organization and the structuring of experience; meaning and cultural values; semantic fields; categorization and prototypes; cognitive model theory; metaphor, metonymy, and mental imagery as source and change of meaning.

Span 5716. The Structure of Modern Spanish: Pragmatics. (3 cr. Prereq–#)
Concepts used in current literature in Spanish pragmatics, such as deixis, presupposition, conversational implicature, speech act theory, and conversational structure.

Span 5721. Spanish Laboratory Phonology. (3 cr; A-F only. Prereq–[5711, honors] or grad student or #)
Core literature on Spanish laboratory phonology. Phonology from a laboratory perspective. Students evaluate laboratory research methodologies, perform basic acoustic analyses, and design laboratory phonology studies.

Span 5731. Spanish Dialectology: Regional and Social Dialects of Modern Spain. (3 cr. Prereq–Three 3xxx or 5xxx linguistics courses in Spanish or #)
Major dialect areas of Spain, with distinguishing phonological, morphological, lexical, and syntactic variations of each. Impact of recent cultural, political, and socioeconomic transformations on language.

Span 5732. Spanish Dialectology: Regional and Social Dialects of Modern Spanish America. (3 cr. Prereq–Three 3xxx or 5xxx linguistics courses in Spanish or #)
Major dialect areas of Spanish America, with distinguishing phonological, morphological, lexical, and syntactic variations of each. Their historical origin and evolution and the impact of cultural, political, and socioeconomic transformations on the language.

Span 5800. Spain's Image and the Hispanic Culture (Towards the XXI Century). (.1 cr; A-F only)
Contemporary Spanish society from perspectives of humanities, social sciences. Major sociocultural changes in Spain during 20th century. Emphasizes current situation, developments leading into 21st century. Literature, history, politics, geographical/regional diversity, art, music, cinema.

For definitions of course numbers, symbols, and abbreviations, see page 296.

Span 5910. Topics in Spanish Peninsular Literature. (3 cr [max 9 cr]. Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)
Problems in Spanish cultural history and their applicability to studies of artistic movements, ideological trends, formal methods, or literary genres. Topics specified in *Class Schedule.*

Span 5920. Topics in Spanish-American Literature. (3 cr [max 9 cr]. Prereq–3104 or Δ)
Spanish-American literature analyzed according to important groups, movements, trends, methods, and genres. Specific approaches depend on topic and instructor. Topics specified in *Class Schedule.*

Span 5930. Topics in Ibero-Romance Linguistics. (3 cr [max 9 cr]. Prereq–#)
Problems in Hispanic linguistics; a variety of approaches and methods.

Span 5970. Directed Readings. (1-4 cr [max 9 cr]. Prereq–MA or PhD candidate, #, Δ , ❑)
Students must submit reading plans for particular topics, figures, periods, or issues. Readings in Spanish and/or Spanish-American subjects.

Span 5985. Sociolinguistic Perspectives on Spanish in the United States. (3 cr. Prereq–Three 3xxx or 5xxx linguistics courses in Spanish or #)
Sociolinguistic analysis of issues such as language maintenance/shift in U.S. Latino communities, code switching, attitudes of Spanish speakers toward varieties of Spanish and English, language change in bilingual communities, and language policy issues.

Span 5990. Directed Research. (1-4 cr [max 9 cr]. Prereq–#, Δ , ❑)

Span 5991. The Acquisition of Spanish as a First and Second Language. (3 cr. Prereq–Three 3xxx or 5xxx linguistics courses in Spanish or #)
Analysis of issues such as the acquisition of Spanish and English by bilingual children; Spanish in immersion settings; developmental sequences in Spanish; classroom language learners' attitudes, beliefs, and motivation; development of pragmatic competence.

Spanish-Portuguese (SpPt)

Department of Spanish and Portuguese Studies

College of Liberal Arts

SpPt 3256. Latin American Cultural Discourse. (3 cr. Prereq–Span 3105)
Cultural assumptions in current modes of interpreting Latin American reality. Representative texts are analyzed.

SpPt 3256H. Honors: Latin American Cultural Discourse. (3 cr; A-F only. §3456, §3256. Prereq–Span 3105, honors)
Cultural assumptions in current modes of interpreting Latin American reality. Analysis of representative texts.

SpPt 3605. Symbolic Expression in Hispanic Politics. (3 cr)
Political upheavals, national liberation movements, and civil wars in Spain, Latin America, Portugal, the Portuguese-speaking countries in Africa, and the Hispanic population in the United States, either individually or in various forms of inter-relations. Political activity and symbolic expression beyond literature. Taught in English.

SpPt 3608. The Political Foundations of Hispanic Theatre. (3 cr)
Study of drama as reality and metaphor using traditional, modern, and vanguard plays. Works of Cervantes, Lope de Vega, Calderón, Unamuno, Valle-Inclán, Triana, and Usigli. Films, videos, attendance of local and touring theatre groups.

SpPt 3611. Modern Latin American and Latino Writing. (3 cr)
A comparative approach to literature of the Spanish- and Portuguese-speaking Americas, including Latino writing in the United States. Emphasis on women's writing. All readings in English. Does not count toward Spanish or Spanish-Portuguese major.

SpPt 5930. Selected Topics in Hispanic Cultural Discourse. (3 cr [max 9 cr]; A-F only. Prereq–Reading knowledge of Span and Port)
Cultural discourses in Spanish- and Portuguese-speaking areas. Historical intersections and divergences. Taught in Spanish and/or Portuguese; English when cross-listed. Topics specified in the *Class Schedule.*

SpPt 5999. The Teaching of College-Level Spanish: Theory and Practice. (3 cr. Prereq–Grad or #)
Theoretical grounding in the general principles of second language acquisition and guidance with their practical applications to the teaching of first- and second-year Spanish at the college-level.

Sport Studies (SpSt)

School of Kinesiology

College of Education and Human Development

SpSt 1701. Introduction to Sport Studies. (2 cr; A-F only)
Scope/motive of the study of sport from a sociological, psychological, historical, economic, and scientific perspective. Issues in sport.

SpSt 3111. Sports Facilities. (2 cr; A-F only. Prereq–SpSt majors only)
A general identification of sports facilities including the special features that make them unique. Emphasis on understanding the role and purpose of planning for such facilities.

SpSt 3112. Applied Sport Science. (2 cr; A-F only. Prereq–SpSt majors only)
Introduction to the historical discovery, transitional development, and current application of basic scientific principles and technology to the improvement of sport performance.

SpSt 3143. Organization and Management of Sport. (3 cr; A-F only. Prereq–SpSt majors only)
Principles, policies, and procedures involved in the administration and management of sports programs at the interscholastic and intercollegiate levels.

SpSt 3421. The Business of Sport. (2 cr; A-F only. Prereq–SpSt majors only)
Overview of the economic and business aspects of professional, collegiate, school-based and amateur sport; financing issues and methods; economic impact of sport on communities, regions, and states; the sport and leisure market.

SpSt 3501. Sport in a Diverse Society. (3 cr; A-F only. Prereq–SpSt)
Relationship between sport and contemporary social institutions (politics, religion, economics, education, mass media). Emphasizes groups/individuals who have historically been marginalized or excluded from sport participation. Variables such as race, sex, social class, sexual orientation, physical (dis)abilities also emphasized.

SpSt 3601. Ethics and Values in Sport. (2 cr; A-F only. Prereq–SpSt majors only; 3611 recommended)
The study of violence, demonstrative behavior, sportsmanship, and other ethical issues involved in the playing of sport, and in the management and governance of the sport industry.

SpSt 3611. Sport Psychology. (2 cr; A-F only. Prereq–SpSt majors only)
Introduction to sport psychology. Examines people and their behavior in sport contexts.

SpSt 3621. Applied Sport Psychology. (2 cr; A-F only. Prereq–SpSt majors only)
Understanding psychological theories and techniques as they apply to sport performance and the personal growth of sport participants.

SpSt 3631. Sport Promotion and Programming. (2 cr; A-F only. Prereq–SpSt majors only)
Scheduling and management of sports events; different program formats; publicity and promotion of sport; the sport product; pricing issues.

SpSt 3641. Training and Conditioning for Sport. (2 cr; A-F only. Prereq–[Kin or SpSt] major)
Overview of history, development, current philosophies of physical training methods used in sport. Theory, scientific basis for training methods, methods for evaluation/prescription.

SpSt 3861. Legal Aspects of Sport. (2 cr; A-F only. Prereq–SpSt majors only)
Survey of legal issues in sport, including governance, contracts, civil rights, civil liberties, torts, due process, and employment and work-related legalities.

SpSt 3881W. Senior Seminar in Sport Studies. (3 cr; A-F only. Prereq–SpSt majors only, completion of major coursework)
Presentations and discussions on sport-related topics of interest.

SpSt 3996. Practicum: The Sport Experience. (1-10 cr [max 10 cr]; S-N only. Prereq–3881)
Practical experience in one or more sport settings.

Statistics (Stat)

School of Statistics

College of Liberal Arts

Stat 1001. Introduction to the Ideas of Statistics. (3 cr. Prereq–High school algebra)
Controlled vs. observational studies; presentation and description of data; chance variation; correlation and causality; confidence intervals; statistical tests.

Stat 1905. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule.*

Stat 3011. Introduction to Statistical Analysis. (4 cr. §5021. Prereq–Two yrs high school math)
Describing data/relationships. Discrete/continuous random variables. Sampling distributions. Confidence intervals. 1-/2-sample significance tests. Simple linear regression.

Stat 3021. Introduction to Probability and Statistics. (3 cr. Prereq–Math 1272)
Elementary probability, probability distributions. Sampling, elements of statistical inference. Regression.

Stat 3022. Data Analysis. (4 cr. Prereq–3011 or 3021)
Practical survey of applied statistical inference and computing covering widely used statistical tools: multiple regression, variance analysis, experiment design, nonparametric methods, model checking and selection, variable transformation, categorical data analysis, logistic regression.

Stat 4101. Theory of Statistics I. (4 cr. §5101, §Math 5651. Prereq–Math 1272)
Random variables/distributions. Generating functions. Standard distribution families. Data summaries. Sampling distributions. Likelihood/sufficiency.

Stat 4102. Theory of Statistics II. (4 cr. §5102. Prereq–4101)
Estimation. Significance tests. Distribution free methods. Power. Application to regression and to analysis of variance/count data.

Stat 4893W. Senior Paper. (1 cr. Prereq–Stat major)
Either (1) paper on specialized area or (2) consulting project or (3) original computer program. Directed study.

Stat 4931. Topics in Statistics. (3 cr)
Topics vary according to student needs and available staff.

Stat 4932. Topics in Statistics. (3 cr. Prereq–#)
Topics vary according to student needs and available staff.

Stat 5021. Statistical Analysis. (4 cr. §3011. Prereq–College algebra or #; Stat course recommended)
Intensive introduction to statistical methods for graduate students needing statistics as a research technique.

Stat 5031. Statistical Methods for Quality Improvement. (4 cr. Prereq–[3021 or 3022 or 4102 or 5021 or 5102 or 8102], Math 1272)
Random variability/sampling. Controlling statistical process. Shewhart/accumulative charting. Analyzing plant data, trend surface, and variance/design of experiments.

Stat 5041. Bayesian Decision Making. (3 cr. Prereq–4101 or 5021 or 5101 or #)
Axioms for subjective probability/utility. Optimal statistical decision making. Sequential decisions/decision trees. Backward induction. Bayesian data analysis.

Stat 5101. Theory of Statistics I. (4 cr. §4101, §5651. Prereq–Math 2263)
Logical development of probability, basic issues in statistics. Probability spaces. Random variables, their distributions and expected values. Law of large numbers, central limit theorem, generating functions, multivariate normal distribution.

Stat 5102. Theory of Statistics II. (4 cr. §4102. Prereq–5101 or Math 5651)
Sampling, sufficiency, estimation, test of hypotheses, size/power. Categorical data. Contingency tables. Linear models. Decision theory.

Stat 5201. Sampling Methodology in Finite Populations. (3 cr. Prereq–3011 or 3021 or 5021 or #)
Simple random, systematic, stratified, unequal probability sampling. Ratio, model based estimation. Single stage, multistage, adaptive cluster sampling. Spatial sampling.

Stat 5302. Applied Regression Analysis. (4 cr. Prereq–3022 or 4102 or 5021 or 5102 or #)
Simple, multiple, and polynomial regression. Estimation, testing, prediction. Use of graphics in regression. Stepwise and other numerical methods. Weighted least squares, nonlinear models, response surfaces. Experimental research/applications.

Stat 5303. Designing Experiments. (4 cr. Prereq–3022 or 4102 or 5021 or 5102 or #)
Analysis of variance. Multiple comparisons. Variance-stabilizing transformations. Contrasts. Construction/analysis of complete/incomplete block designs. Fractional factorial designs. Confounding split plots. Response surface design.

Stat 5401. Applied Multivariate Methods. (3 cr. Prereq–5302 or 8102 or #)
Bivariate and multivariate distributions. Multivariate normal distributions. Analysis of multivariate linear models. Repeated measures, growth curve and profile analysis. Canonical correlation analysis. Principle components and factor analysis. Discrimination, classification, and clustering.

Stat 5421. Analysis of Categorical Data. (3 cr. Prereq–5302 or 8102 or #)
Varieties of categorical data, cross-classifications, contingency tables. Tests for independence. Combining 2x2 tables. Multidimensional tables/loglinear models. Maximum-likelihood estimation. Tests for goodness of fit. Logistic regression. Generalized linear/multinomial-response models.

Stat 5601. Nonparametric Methods. (3 cr. Prereq–3022 or 4102 or 5021 or 5102 or #)
Order statistics. Classical rank-based procedures (e.g., Wilcoxon, Kruskal-Wallis). Goodness of fit. Topics may include smoothing, bootstrap, and generalized linear models.

Stat 5931. Topics in Statistics. (3 cr)
Topics vary according to student needs and available staff.

Stat 5932. Topics in Statistics. (3 cr)
Topics vary according to students' needs and available staff.

Stat 5993. Tutorial. (1-6 cr [max 12 cr]. Prereq–#)
Directed study in areas not covered by regular offerings.

Studies in Cinema and Media Culture (SCMC)

Department of Cultural Studies and Comparative Literature

College of Liberal Arts

SCMC 1201. Introduction to Cinema and Media Culture. (4 cr. §CSCL 1201)
Critical analysis of films, particularly as they emerge within context of mass culture. Determining discursive specificity of cinema, network of institutions that expose this discourse to other media discourses. Rudiments of film theory. Brief engagement with production.

SCMC 3001. History of Cinema and Media Culture. (3 cr)
Genealogy of cinema in relation to other media, notably photography, radio, television/video and the Internet. Representative films from decisive moments in global development of cinema. Rise/fall of Hollywood studio system, establishment of different national cinemas, cinematic challenges to cultural imperialism, emergence of post-cinematic technologies.

SCMC 3177. On Television. (4 cr. §CSCL 3177)
Key debates in the history, theory, and criticism of television. Focuses on critical/creative "readings" of television's past/present forms. TV's influence on film, music, and digital media.

SCMC 5001. Critical Debates in the Study of Cinema and Mass Culture. (3 cr)
Basic concepts in historical/international debates over production/reception of mass culture. Emphasizes cinema. Advanced orientation toward intellectual traditions that inform contemporary scholarship.

Sumerian (Sum)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Sum 5011. Elementary Sumerian I. (3 cr. Prereq–Adv undergrads with 2 yrs of another foreign lang, grads)
Sumerian writing and grammar. Readings from classical Sumerian literary and historical texts.

Sum 5012. Elementary Sumerian II. (3 cr. Prereq–5011)
Reading from classical literary and historical texts.

Swedish (Swed)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

Swed 1001. Beginning Swedish. (5 cr)
Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.).

Swed 1002. Beginning Swedish. (5 cr. Prereq–1001)
Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and the Swedish culture.

Swed 1003. Intermediate Swedish. (5 cr. Prereq–1002)
Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments.

Swed 1004. Intermediate Swedish. (5 cr. Prereq–1003)
Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments.

Swed 3011. Advanced Swedish. (4 cr. Prereq–Passing score on the GPT)
Designed to help students achieve advanced proficiency in Swedish. Discussion of fiction, film, journalistic, and professional prose is complemented by grammar and vocabulary building exercises and a systematic review of oral and written modes of communication.

Swed 3012. Advanced Swedish. (4 cr. Prereq–Passing score on GPT)
Discussion of novels, short stories, plays, articles. Structural, stylistic, vocabulary-building exercises.

Swed 4001. Beginning Swedish. (2 cr. §1001. Prereq–Passing score on GPT in another language or grad)
Course meets concurrently with Swed 1001; see Swed 1001 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Swed 4002. Beginning Swedish. (2 cr. §1002. Prereq–Passing score on GPT in another language or grad)
Course meets concurrently with Swed 1002; see Swed 1002 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Swed 4003. Intermediate Swedish. (2 cr. §1003. Prereq–passing score on GPT in another language or grad)
Course meets concurrently with Swed 1003; see Swed 1003 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Swed 4004. Intermediate Swedish. (2 cr. §1004. Prereq–Passing score on GPT in another language or grad)
Course meets concurrently with Swed 1004; see Swed 1004 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Teaching English as a Second Language (TESL)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

TESL 1904. Freshman Seminar. (3 cr; A-F only)
Topics vary. See *Class Schedule*.

TESL 1905. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule*.

TESL 3001. Basics in Teaching English as a Second Language. (4 cr. Prereq–Have studied another language, 550 TOEFL score [if non-native speaker])
Basic orientation to current theories/methods of English as a second language (ESL) instruction. Emphasizes methodologies for teaching/assessing listening, speaking, pronunciation, reading, writing skills. Contexts of teaching English to adults in the United States and abroad. Internship at school or agency teaching ESL.

TESL 5401. Language Analysis for Teachers of English as a Second Language. (4 cr. Prereq–Ling 5001)
Overview of the structure of the English language geared to the needs of teachers of English to speakers of other languages. Study the structures of English from the point of view of second-language speakers as well as native speakers. Phonetics, phonology, morphology, and some aspects of the syntax of the English language. Part of a two-course sequence.

TESL 5402. Language Analysis for Teachers of English as a Second Language. (4 cr. Prereq–5401, Ling 5001)
Overview of the structure of the English language geared to the needs of teachers of English to speakers of other languages. Study the structures of English from the point of view of second-language speakers as well as native speakers. More complex structures of English syntax, as well as English semantics, pragmatics, and discourse structures. Second in a two-course sequence.

TESL 5721. Methods in Teaching English as a Second Language. (3 cr. Prereq–Ling 3001 or 5001 or #)
Introduction to methods for teaching English as a second language to adults.

TESL 5722. Practicum in Teaching English as a Second Language. (4 cr [max 8 cr]; S-N only. Prereq–[[5401 or ¶5401], [5402 or ¶5402], 5721, ESL major or ESL minor] or #)
Observation of, and practice in, teaching English as a second language to adults at college or university level.

TESL 5723. Materials for Teaching English as a Second Language. (3 cr. Prereq–5721, 5722 or #)
Evaluation and preparation of teaching materials for English as a second language.

TESL 5724. Introduction to Language Assessment. (3 cr; A-F only)
How to engage in meaningful, appropriate, and fair second-language assessment practices; interpret test results; and construct new forms of assessment.

TESL 5900. Topics in Second Language Learning and Teaching. (1-4 cr [max 16 cr])
Topics vary. See *Class Schedule*.

TESL 5910. Seminar in Teaching English as a Second Language. (3 cr [max 9 cr]. Prereq–#)
Topics related to English as a second language and applied linguistics. Topics specified in *Class Schedule*.

TESL 5993. Directed Studies. (1-4 cr [max 9 cr]. Prereq–#, Δ, ❑)
Directed study for teaching English as a second language.

Theatre Arts (Th)

Department of Theatre Arts and Dance

College of Liberal Arts

Th 1101V. Honors Section: Introduction to the Theatre. (4 cr. §1101W)
Introduction to art/craft of theatre. Appreciation/critical analysis of plays/performances. Examples of theatre's diverse interactions with society considered from various cultural perspectives.

Th 1101W. Introduction to the Theatre. (4 cr)
Introduction to art/craft of theatre. Appreciation/critical analysis of plays/performances. Examples of theatre's diverse interactions with society considered from various cultural perspectives.

Th 1102. Drama and the Media. (3 cr)
Drama and cultural values implicit in media. Study of primary texts (biography, history, the novel, plays), video clips, and complete films. How the film medium shapes cultural identity.

Th 1111. Introduction to the Theatre—Condensed Version. (3 cr. Prereq–Theatre majors/premajors should not enroll)
Art/craft of theatre. Appreciation, critical analysis of plays/performances. Ways theatre interacts with society. Examples from diverse theatre over the ages and from various cultural perspectives. Seven weeks.

Th 1112. Drama and the Media—Condensed Version. (3 cr)
Drama/cultural values implicit in media. Study of primary texts (biography, history, the novel, plays); video clips; complete films. How film/television shape collective cultural identity. Seven weeks.

Th 1301. Beginning Acting for Non-Theatre Majors. (3 cr. Prereq–1101 or ¶1101)
Background/techniques of acting as viewed/practiced in theatre, society, and student's own relationships.

Th 1321. Fundamentals of Performance. (3 cr; A-F only. Prereq–1101 or ¶1101)
Introduction to vocabulary/techniques for practical performance studies. Use/training of body/voice. Creation of choices and dramatic phrases. Storytelling. Training the will, the instrument, and the imagination. First of two-course sequence: must be taken in sequence with 1322.

Th 1322. Creating the Performance. (3 cr; A-F only. Prereq–1321 [taken preceding sem or summer session])
Introduction to responsibilities/techniques of modern stage director as creative/interpretive artist. Creation of directed performance of invented/pre-existing forms, from happenings to traditional psychological/poetic realism.

Th 1351. Vocal Production and Beginning Movement for Actors. (3 cr. Prereq–1101)
Part I: exercises to develop abdominal breathing, tonal placement, and clear articulation; analysis/performance of prose, poetry, and dramatic texts. Part II: body movement/relaxation combined with acting technique leading to individual/group performance.

Th 1361. Singing for Musical Theatre. (3 cr; A-F only)
Beginning singing, interpretation, part singing, phonetics, audition techniques. Solo/ensemble presentations at final class performance.

Th 1391. BFA Acting I. (7 cr; A-F only. Prereq–Accepted into BFA acting program)
Acting, voice, movement. First section in a sequence of eight. Concentrates on building foundation for further work in the program.

Th 1392. BFA Acting II. (7 cr; A-F only. Prereq–1391)
Core curriculum for BFA Actor Training Program in acting, voice, and movement. Second section in sequence of eight. Concentrates on story-telling and on deepening work of previous semester.

Th 1393. BFA Acting III. (7 cr; A-F only. Prereq–1392)
Interpreting dramatic material. Third in sequence of eight.

Th 1394. BFA Acting IV. (7 cr; A-F only. Prereq–1393)
Interpreting dramatic material. Fourth in sequence of eight.

Th 1405H. Theatre: Spaces and Practices. (2 cr. Prereq–1101 or ¶1101, honors)
Various theatre subjects developed by pool of instructors.

Th 1905. Freshman Seminar. (3 cr [max 6 cr]; A-F only)
Topics specified in *Class Schedule*.

Th 1909W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr or max 36 cr)
Topics specified in *Class Schedule*.

Th 1910W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–Fr with no more than 24 cr)
Topics specified in *Class Schedule*.

Th 1911W. Freshman Seminar: Theatre, Entertainment With Attitude. (3 cr; A-F only. Prereq–Fr or 24 cr)
Richness/diversity of live theatre as performance/text. Developing critical language/eye with which to think about live performance. Students attend performances at Twin Cities theatres. In-class discussions, talks with theatre/dance professionals.

Th 3100. Theatre Practicum. (1 cr [max 4 cr]; S-N only. Prereq–1101; only two registrations as actor may count toward major)
Participation in University Theatre main stage play as actor, construction/running crew personnel, or theatre management operations personnel.

Th 3115. Introduction to Playwriting. (3 cr. Prereq–#)
Study of traditional play structure, characterization, dialogue, dramatic action, and theme. Final project is a one-act play.

Th 3120. Theatre: Theory and Practice. (3 cr [max 6 cr]. Prereq–1101)
Introduction to diverse ways of thinking about theatre and its representational practices. Students explore traditional/non-traditional modes of performance through readings, discussions, and hands-on performance projects. Seminar-style course.

Th 3171. History of the Theatre: Ancient Greece Through Neo-Classicism. (3 cr. Prereq–Th major or #)
History of Western theatre and drama; theatrical practices, staging conventions, and dramatic structure of plays. Ancient to mid-18th century.

Th 3172. History of the Theatre: Age of Enlightenment to Present. (3 cr. Prereq–Th major or #)
Theatrical practices, staging conventions, dramatic structure of plays.

Th 3261. Dramas of Culture: 20th-Century French and Francophone Theatre. (3 cr. Prereq–Fren 3101)
Key movements, dramatists, and contexts of 20th-century French and Francophone theatre. Naturalist and symbolist legacies as well as existentialist, avant-garde, and contemporary performance and drama.

Th 3314. Text and the Actor. (3 cr; A-F only. Prereq–1101, 1321)
Standard stage speech, International phonetic alphabet transcription, and textual analysis to perform heightened language texts such as Shakespearean/Shavian monologues, Chaucer's Canterbury Tales, and Beowulf. Videos viewed/discussed.

Th 3321. Stanislavski and Techniques for Characterization. (3 cr. Prereq–1322, [3314 or ¶3314], audition)
Analysis of text, character, and relationship in scenes/monologues from contemporary/modern psychologically-based drama, early 20th-century texts, and classical repertoire. Lecture, discussion, exercises, performance.

Th 3322. Advanced Techniques for Characterization. (3 cr. Prereq–3321)
Analysis of text, character, and relationship in scenes/monologues from contemporary/modern psychologically-based drama and from early 20th-century texts. Lecture, discussion, exercises, performance.

Th 3331. Physical Approaches to Acting. (3 cr. Prereq–1322, [3314 or ¶3314])
Dynamic physical approach to acting. Expanding expressiveness/creativity. Strengthening connections between physical/vocal expression. Uniting instinct and intellectual analysis. Techniques as advanced by Delsarte, Meyerhold, Grotowski, Kantor, Suzuki, Barba, etc., and structured improvisation, are incorporated in solo/collaborative performance projects.

Th 3355. Introduction to Puppetry. (3 cr. Prereq–1322, [3513 or ¶3513])
Puppet/object theatre/performance introduced through traditional/contemporary puppetry forms. Object theatre, toy theatre, hand puppets, shadow-/Bunraku-style puppets. Readings, in-class screenings of videos/slides. Students build/create series of short works for in-class performance.

Th 3361. Introductory Musical Theatre. (3 cr; A-F only. Prereq–#)
History of American musical theatre featuring videos/discussions, basic music theory, voice, dance, acting, audition techniques. Solo/ensemble presentations for public class performance.

Th 3365. Intermediate Musical Theatre. (3 cr; A-F only. Prereq–3361 or #)
American musical theatre history. Singing, interpretation, dance techniques. Culminates in solo/ensemble presentations in public class performance.

Th 3391. BFA Acting V. (7 cr; A-F only. Prereq–1394)
Process towards performance. Fifth in sequence of eight.

Th 3392. BFA Acting VI. (7 cr; A-F only. Prereq–3391)
Process towards performance. Sixth in sequence of eight.

Th 3503. Design and Technical Production I: BFA. (3 cr. §3513. Prereq–BFA theatre arts student)
Theory, process, and execution of design/technology from script to production on stage. Scenery/properties.

Th 3505. Design and Technical Production II: BFA. (3 cr. §3515. Prereq–3513, BFA theatre arts student)
Theory, process, and execution of design/technology from script to production on stage. Costumes/lighting.

Th 3513. Design and Technical Production I. (4 cr. Prereq–1101)
Theory, process, and execution of design/technology from script to production on stage. Scenery/properties.

Th 3515. Design and Technical Production II. (4 cr. Prereq–3513)
Theory, process, and execution of design/technology from script to production on stage. Costumes/lighting.

Th 3950. Topics in Theatre. (1-4 cr [max 8 cr]. Prereq–Varies by topic)
Topics specified in the *Class Schedule*.

Th 3993. Directed Study. (1-4 cr [max 12 cr]. Prereq–6 Th cr, #, Δ, ❑)
Guided individual reading or study.

Th 4131. Shakespeare: Comedies, Romances, and Problem Plays. (3 cr. Prereq–1101 or #)
Shakespeare's plays as live theatre, both for the stage and in various media. Work of actors, directors, and designers in Shakespearean plays.

Th 4132. Shakespeare: Histories and Tragedies. (3 cr. Prereq–1101 or #)
Shakespeare's plays as live theatre, both for the stage and in various media. Work of actors, directors, and designers in Shakespearean plays.

Th 4177W. Survey of Dramatic Literature I: Strategic Interpretation. (3 cr. Prereq–[[3171, 3172], [jr or sr]] or #)
Basic principles of script analysis as applied to stage practice from traditional/postmodern approaches. Students read plays, critical perspectives. Discussion, critical writing, performance.

Th 4178W. Survey of Dramatic Literature II: Representation and Its Effects. (3 cr. Prereq–[[3171, 3172], [jr or sr]] or #)
In-depth look at how plays actively participate in production of social values and of society itself. Emphasizes consequences of choices theatre artists make.

Th 4321. Career Preparation for the Actor. (3 cr. Prereq–3322)
Information/techniques necessary for professional acting career.

Th 4322. Acting for the Camera. (3 cr. Prereq–3321)
Differences between stage acting and acting for camera. Hands-on experience with film equipment. Scenes/monologues rehearsed/performed for camera. Videotape playback for class critique.

Th 4391. BFA Acting VII. (7 cr; A-F only. Prereq–3392)
Applying first three years of training toward performance. Seventh in sequence of eight.

Th 4392. BFA Acting VIII. (7 cr; A-F only. Prereq–4391)
Application of first three years of training toward performance. Career preparation. Eighth in sequence of eight.

Th 4532. Makeup for the Actor. (2 cr. Prereq–1101)
Topics vary. May include functions/aesthetics of stage makeup, application techniques, prosthetics, and facial hair.

Th 4550. Basic Video Technology. (1 cr)
Lighting, camera operation, and recording. Hands-on training. Students work toward a final group project using state-of-the-art equipment. Aspects of video/film production.

Th 4553. Advanced Video Technology. (3 cr. Prereq–[4550, 4557] or #)
Video production techniques. Lighting, camera operation, control room equipment/operation. Chroma and other types of keying. Hands-on training with equipment, techniques necessary for video production. Students are involved with every aspect behind camera and explore within their own projects.

Th 4554. Graphics and Animation for Video. (3 cr)
Students explore and experiment with graphic/animation software. Video production, live performance.

Th 4555. Audio Technology. (3 cr. Prereq–Th major or #)
Sound as science. Technology to create/manipulate sound. Recording techniques. Effects/signal processing. Microphone/mixing techniques.

Th 4556. Digital Audio and MIDI for Performance. (3 cr. Prereq–#)
Hands-on computer/CPU-generated audio technology. Use of MIDI language protocol for performance in all aspects of the arts.

Th 4557. Audio for Film and Video. (3 cr. Prereq–[4550, 4555] or #)
Processes/techniques used in capturing, manipulating, and producing audio for use in film/television production. Students experiment and create audio. Challenges in creating audio for various mediums.

Th 4711. Intermediate Stage Direction. (3 cr. Prereq–1322 or #)
Coordinating/guiding collaborative artistic team. Script selection, textural analysis, concept development, space use, composition, movement, dialogue. Final presentation of scene. Intensive research, textural examination, journal.

Th 4901. Senior Seminar. (2 cr; S-N only. Prereq–Sr, [Th or Dnce major]; offered fall semester only)
Development of senior project, alone or in groups, under guidance of faculty members.

Th 4905H. Honors Course: Tutorial Seminar in Theatre Arts. (2-4 cr [max 4 cr]. §4905. Prereq–honors, theatre arts, Δ; limit [2 cr for [*cum laude* or *magna cum laude*], 4 cr for *summa cum laude*])
Independent reading/research in preparing honors thesis or selected creative project.

Th 5100. Theatre Practicum. (1-4 cr [max 20 cr]. Prereq–#, Δ [4 cr of 3100 for undergrads])
Individual creative projects in production of approved plays as an actor, director, dramaturg, or playwright. (See 5500 for design practicums.)

Th 5171. History of the Theatre I. (3 cr)
Theatre as a mirror of society. Aesthetics, philosophy, and practices of theatre arts. Ancient to mid-18th century.

Th 5172. History of the Theatre II. (3 cr)
Theatre as a mirror of society. Aesthetics, philosophy, and practices of theatre arts. Mid-18th century to the present.

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

Th 5182. Contemporary Black Theatre: 1960-Present. (3 cr)
Essays, plays, playwrights, and theatres that have contributed to contemporary Black theatre. From the beginning of the Black Arts Movement to the present.

Th 5331. Physical Approaches to Acting: Use of Self. (2 cr. Prereq–MFA or # by audition)
Movement for advanced actors: awareness, flexibility, observation, release, improvisation in both verbal and nonverbal physical modes.

Th 5332. Physical Approaches to Acting: Stage Combat. (2 cr. Prereq–MFA or # by audition)
Movement for advanced actors: awareness, flexibility, observation, release, improvisation in both verbal and nonverbal physical modes; focus on stage combat.

Th 5333. Physical Approaches to Acting: Period Styles. (2 cr. Prereq–MFA or # by audition)
Movement for advanced actors: awareness, flexibility, observation, release, improvisation in both verbal and nonverbal physical modes; focus on period styles of movement.

Th 5334. Physical Approaches to Acting: Mask. (2 cr. Prereq–MFA or # by audition)
Movement for advanced actors: awareness, flexibility, observation, release, improvisation in both verbal and nonverbal physical modes; focus on mask work.

Th 5341. Speech for Actors. (2 cr; A-F only. Prereq–MFA or #)
Theories of professional voice production, anatomy and physiology of the vocal mechanism and respiratory system, phonetics, tonal placement, vowel standardization, and articulation are applied to dramatic texts.

Th 5342. Classical Text for Actors. (3 cr; A-F only. Prereq–MFA or #)
Metrical and rhetorical techniques used in the dramatic texts of Shakespeare and Shaw, as well as textual performance styles from Elizabethan to contemporary. Discussion, presentation, oral reports, and performances.

Th 5500. Theatre Design Practicum. (1-3 cr [max 20 cr]. Prereq–3515, Δ, #)
Individual projects in production of approved plays as a designer of scenery/properties, costumes, lighting, or sound. (See 5100 for other creative practicums.)

Th 5510. Drawing, Rendering, and Painting for the Theatre Designer I. (3 cr. Prereq–3515 or grad or #)
Development of skills necessary for presentation of theatre scene/costume designs. Materials, layout, and techniques in scene painting. Basic drawing/graphic skills.

Th 5515. Design Composition and Collaboration. (3 cr. Prereq–Grad or 3515, 3711; #;)
Classical composition of art and its application to stage design and directing through the collaborative process.

Th 5520. Scene Design. (3 cr [max 9 cr]. Prereq–3515 or grad or #)
Conceiving/communicating design ideas in both two-dimensional sketches and three-dimensional models for theatre and allied venues. Drafting.

Th 5530. Costume Design. (3 cr [max 9 cr]. Prereq–3515 or grad or #)
Theory and process of costume design for theatrical productions (e.g., dance, opera, film) through hypothetical productions.

Th 5540. Lighting Design for the Theatre. (3 cr [max 9 cr]. Prereq–3515 or grad or #)
Design aesthetics and exploration of design for various stage forms and venues. Development of the lighting plot and paperwork; use of the computer in lighting design.

Th 5545. Stage Lighting Technology. (3 cr. Prereq–3515 or grad or #)
The lighting technician's skills and crafts: equipment, techniques, control operation, wiring, and maintenance.

Th 5551. Editing and Post Production for Video and Film. (3 cr. Prereq–4553)
Students manipulate software and other technologies used in post production. Editing, audio, image manipulation.

Th 5553. Video Production Design and Aesthetics. (3 cr. Prereq–4553 or #)
Use of technologies in video/film in making a statement or communicating an idea/emotion. Creativity, sensitivity to an audience. Students explore different creative uses of technologies/medium.

Th 5554. Multimedia Production for Live Performance. (3 cr. Prereq–5553 or #)
Use of multimedia production technologies in actual production. Students apply knowledge/skill in conjunction with an artistic team on a production and are an integral part of the development/realization of that production.

Th 5556. Audio Engineering. (3 cr. Prereq–4555 or #)
Miking/recording techniques specific to music and dramatic dialogue. Students explore recording different styles of music. Hands-on experience in recording bands and doing final mixes to a demo CD. Field trips to professional studios and club/concert recordings.

Th 5558. Audio Systems Analysis and Installation. (3 cr. Prereq–4555 or #)
Analyzing, designing, developing specifications, and installing sound systems. Students work from client program lists, with given resources and given spaces, to arrive at best possible audio system. Hands-on experience.

Th 5559. Sound Design for Performance. (3 cr. Prereq–5555 or #)
Audio technology and psychology and their impact on an audience in a performance situation. Communication, design process, psychoacoustics, and script analysis.

Th 5560. Drawing, Rendering, and Painting for the Theatre Designer II. (3 cr. Prereq–5510)
Development of skills necessary for presentation of theatre scene/costume designs. Materials, layout, and techniques in scene painting. Rendering and scene painting skills.

Th 5570. Properties/Scenery Technology. (1-3 cr [max 15 cr]. Prereq–3515 or grad or #)
Management, structures, upholstery, mask-making, furniture construction, stage mechanics, soft properties, faux finishes. Topics specified in *Class Schedule*.

Th 5580. Costume Technology. (1-3 cr [max 15 cr]. Prereq–3515 or grad or #)
Fabric enhancement techniques, masks, wig-making, millinery, makeup prosthetics, pattern drafting, and draping. Topics specified in *Class Schedule*.

Th 5590. Theatre Technology Practicum. (1-3 cr [max 15 cr]. Prereq–3515, #, Δ ; 4 cr max for undergrads)
Individual creative project in technology/craft area of theatre. Practical work in costume, lighting, makeup, props, scenery, sound, or theatre management.

Th 5711. Advanced Stage Direction. (3 cr. Prereq–[4711, #] or grad student)
Realistic/nonrealistic dramatic forms. Theory/technique of rehearsal. Production problems. Includes directing of three one-act plays.

Th 5713. Theory and Practice of Performance. (3 cr; A-F only. Prereq–[3171, 3172, [4177 or 4178], 5711] or grad student)
Traditions of thinking about theatre, from ancient Greece to present, in practical applications. Focuses on epistemological significance of performance in current critical practices of postmodernism, psychoanalysis, and phenomenology.

Th 5714. The Drama of Myth. (3 cr. Prereq–[1322, 3171, 3172] or #)
Role of myth in performance. Students choose a myth and study its iconography, tracing its journey in painting, sculpture, music, and other texts that accumulated around it throughout history. Course culminates in creation of a non-traditional performance score that embodies/reveals energies of contemporary culture within ancient metaphor of a chosen myth.

Th 5715. Actor-Director Collaboration. (3 cr. Prereq–grad or 3322, 3711)
Applying advanced acting and directing technique to an artistic, collaborative process that promotes flexibility and creativity. Actors and directors are exposed to a challenging range of roles, styles, and scenes.

Th 5716. Stage Management for the Theatre. (4 cr. Prereq–[1101, 1321, soph] or grad)
Theories, practicalities, and techniques for rehearsal/performance. Organizing/managing various types of performance venues.

Th 5718. Principles of Theatre Management. (3 cr. Prereq–#)
Nonprofit theatre structure: concept; mission; organization; financial, marketing, fund-raising, and grant-writing strategies. Discussion/guest professionals from Twin Cities' arts/funding communities.

Th 5753. Text Analysis for Drama. (3 cr. Prereq–5711 or grad)
Tools for intensive textual analysis for advanced directors/designers. Traditional, Aristotelian analysis and contemporary approaches covered through theories/writings of Bertolt Brecht and Howard Barker.

Th 5760. Advanced Stage Management. (2-3 cr. Prereq–5716 or ¶5716, # [4 cr max for undergrads])
Practical experience in stage management for specific productions of the University Theatre with emphasis on rehearsal and performance.

Th 5780. Advanced Topics in Theatre Management. (2-4 cr [max 8 cr]. Prereq–5718)
Study and apply theatre management theories and techniques learned in 5718. Marketing/audience development, fundraising and grant writing strategies, and financial management of a nonprofit theatre organization.

Th 5950. Topics in Theatre. (1-4 cr [max 20 cr]. Prereq–Varies by topic)
Topics specified in *Class Schedule*.

Th 5993. Directed Study. (1-5 cr [max 20 cr]. Prereq–6 Th cr, #, Δ , ❑)
Guided individual reading or study.

Toxicology (Txcl)

Graduate School

Txcl 5011. Principles of Toxicology. (2 cr; A-F only. Prereq–Grad txcl major or #)
Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers.

Txcl 5195. Veterinary Toxicology. (3 cr; A-F only. Prereq–Grad student or #)
Toxicology of minerals, pesticides, venoms, and various toxins. Identification of poisonous plants. Recognition, diagnosis, and treatment of animal poisons.

Txcl 5545. Introduction to Regulatory Medicine. (2-4 cr; A-F only. Prereq–Grad student or #)
Explanation of products requiring pre-market approval and those that may be marketed without approval. Post-market surveillance. Adverse reactions, removal of product from market.

Translation and Interpreting (TrIn)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

TrIn 1201. Fundamentals of Health Care for Interpreters. (3 cr; A-F only)
Technical vocabulary, oral discourse patterns used by health care providers in talking to patients, family members. Language of American health care interview.

TrIn 1301. American Law for Interpreters. (3 cr)
American legal system. Technical vocabulary used in courts and other legal settings. Oral legal discourse. Presentations by specialists, discussion, exercises for review/practice.

TrIn 3001. Introduction to Translation. (3 cr. Prereq–Bilingual proficiency in English and the second language of instruction.)
Theory of and supervised practice in translation; examination of the process of re-expressing meaning in a second language. Translation primarily of English language texts concerning public health and safety, legal and voting rights, regulations and procedures, etc., intended for the general public.

TrIn 3101. Introduction to Interpreting. (3 cr. Prereq–3001 recommended, high level of proficiency in spoken English and another language)
Practical and theoretical introduction to interpreting in health, human service, and legal settings. Emphasis on understanding the unique role of the interpreter, current models and modes of interpreting, ethical issues and professional standards of practice, and developing pre-interpreting skills.

TrIn 3102. Consecutive Interpreting. (3 cr. Prereq–3101, high level of proficiency [in spoken English and in another language] as demonstrated by application)
Practice/theory at professional level in interpreting in health, human service, legal settings. Emphasizes professional/client dialogues. Consecutive interpreting skills, vocabulary research/storage, intercultural issues. Analyzing interpretive process. Performance assessment through audio/videotaping. Subject languages (e.g., Spanish, Russian, Somali) specified for each section.

TrIn 5900. Topics in Translation and Interpreting. (1-4 cr [max 4 cr]. Prereq–#)
Topics specified in *Class Schedule*.

TrIn 5993. Directed Study. (1-3 cr. Prereq–#, Δ , ❑)
Directed study in translation and interpretation.

University College (UC)

College of Continuing Education

UC 1000. Exploring Educational Options. (1 cr [max 20 cr]; S-N only. Prereq–Δ , #)
Clarifying expectations, resources, and challenges for transition into (back to) college. Students assess their interests and learning style as they relate to a college major. Internet as means of gaining options for education. Individualized degrees at the University, how to prepare an application for them. Campbell Skills and Interest Survey, Learning Styles Inventory, written assignments. Materials fee: $25.

UC 3075. Directed Study. (1-15 cr. Prereq–#)

UC 3950. Special Topics. (1-4 cr [max 12 cr]; A-F only)
Special topics course.

UC 4301. Perspectives: Interrelationships of People and Animals in Society Today. (2 cr)
Interrelationships of people and animals from several viewpoints. Social, economic, and health consequences of these relationships, including issues such as pets and people sharing an urban environment, animal rights, and the influence of differences in cultures on animal-human relationships.

UC 4525. Garbage and the Human Environment. (3 cr; A-F only)
Human development, use of natural resources, waste production, pollution of environment, waste management. Comparative look at issues/problems associated with rapid technological development. Laws to control waste production and manage accumulated waste.

UC 5075. Directed Study. (1-8 cr; A-F only)
Directed study.

UC 5950. Special Topics. (1-8 cr; A-F only)
Special topics.

Urban Studies (UrbS)

Department of Geography

College of Liberal Arts

UrbS 1001W. Introduction to Urban Studies: The Complexity of Metropolitan Life. (3 cr; A-F only. §3001)
Introduction to the field of Urban Studies and to the subject of cities. Course is broadly interdisciplinary, ranging across spatial, historical, economic, political, and design perspectives, among many others. For majors and interested others.

UrbS 3001W. Introduction to Urban Studies: The Complexity of Metropolitan Life. (3 cr; A-F only. §1001)
Introduction to the field of Urban Studies and to the subject of cities. Course is broadly interdisciplinary, ranging across spatial, historical, economic, political, and design perspectives, among many others. For majors and interested others.

UrbS 3201. Urban Studies Colloquium. (1 cr [max 4 cr]; A-F only)
Urban/metropolitan issues. Topics vary to reflect current concerns. In-depth reading, intensive group discussion.

UrbS 3202. Urban Studies Colloquium. (1 cr [max 4 cr]; A-F only)
Urban/metropolitan issues. Topics vary to reflect current concerns. In-depth reading, intensive group discussion.

UrbS 3301W. American Cities As Settings for Cultural Diversity. (3 cr)
Explores cultural diversity in American cities, considering patterns of and reasons for racial and class segregation and interaction. Its foci are the problems, conflicts, and successes of cultural diversity from a multidisciplinary perspective.

UrbS 3500. Urban Studies Workshop. (3 cr [max 9 cr]; A-F only)
Links academic learning to actual urban problems/issues. Focus on specific topic using local community as laboratory. Field work, contact with local institutions/agencies.

UrbS 3751. Understanding the Urban Environment. (3 cr; A-F only)
Examine links between cities and the environment with emphasis on air, soil, water, pollution, parks and green space, undesirable land uses, environmental justice, and the basic question of how to sustain urban development in an increasingly fragile global surrounding.

UrbS 3900. Urban Studies Internship Seminar. (2 cr [max 4 cr]; A-F only. Prereq–Sr, internship placement, Δ, #)
Weekly seminar integrates internship experience with academic program.

UrbS 3955W. Senior Paper Seminar. (2 cr; A-F only. Prereq–Δ, UrbS sr, #)
Methods/resources for research. Substantial writing.

UrbS 3993. Urban Studies Directed Study. (2-3 cr [max 6 cr]; A-F only. Prereq–UrbS majors, #, Δ, ❑)
For students with a specific educational objective that cannot be satisfied through regular curriculum (e.g., foreign study) and for honors students to complete an honors opportunity.

UrbS 5101. The City and the Metropolis: An Exploration. (3-4 cr. Prereq–Grad or advanced UrbS undergrad with #)
Advanced interdisciplinary examination of complex metropolitan environments using a grounded experiential approach. Examine the topic from historical, spatial, social, economic, political, policy and design perspectives. Day-long or weekend-long field trips are expected.

Urdu (Urdu)

Department of Asian Languages and Literatures

College of Liberal Arts

Urdu 1001. Introduction to Conversational Urdu. (3 cr)
Development of spoken Urdu. Fundamentals of composition.

Urdu 1101. Beginning Urdu. (5 cr)
Basic listening, speaking, reading, and writing skills. Emphasizes development of communicative competence.

Urdu 1102. Beginning Urdu. (5 cr. Prereq–1101 or #)
Basic listening, speaking, reading, and writing skills. Emphasizes development of communicative competence.

Urdu 3131. Intermediate Urdu. (5 cr. Prereq–1102 or #)
Development of reading, writing, speaking, and listening skills. Grammar review, basic compositions, oral presentations.

Urdu 3132. Intermediate Urdu. (5 cr. Prereq–3131 or #)
Development of reading, writing, speaking, and listening skills. Grammar review, basic compositions, oral presentations.

Veterinary Pathobiology (VPB)

Department of Veterinary Pathobiology

College of Veterinary Medicine

VPB 2022. General Microbiology. (2 cr. Prereq–3 cr biol)
Fundamental principles of microbiology; bacterial metabolism, growth, and genetics; biology of viruses and fungi; control of microorganisms; host-microbe interactions; microorganisms and disease; applied microbiology. Intended primarily for non-microbiology majors.

VPB 2032. General Microbiology with Laboratory. (4 cr. Prereq–3 cr biol)
Fundamental principals of microbiology; bacterial metabolism; growth and genetics; biology of viruses and fungi; control of microorganisms; host-microbe interactions; microorganisms and disease; applied microbiology. Intended primarily for non-microbiology majors.

VPB 5601. Veterinary Parasitology. (4 cr)

Water Resources Science (WRS)

Graduate School

WRS 5001. Introduction to Field Research in Water Resources. (2 cr. Prereq–Grad WRS major or #)
Introduction to field research techniques and opportunities during two-week summer excursion to regional sites. Data acquisition in large/small lakes, streams, and wetlands for biota and chemical/physical water quality; surface and groundwater hydrologic measurements and sampling.

WRS 5101. Water Resources: Individuals and Institutions. (3 cr. Prereq–Grad student or #)
Control of water resources by natural system functions, user actions, and influence of social and political institutions. How these controls vary in space and time; complexities of each control and feedbacks among them.

WRS 5241. Ecological Risk Assessment. (3 cr. Prereq–#)
Evaluating current/potential impact of physical, chemical, and biological agents on ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating/managing risks. Class participation, two reaction papers, final exam, small-group project.

Women's Studies (WoSt)

Department of Women's Studies

College of Liberal Arts

WoSt 1001W. Introduction to Women's Studies. (3-4 cr)
U.S. multi-/cross-cultural studies of contemporary social, cultural, and personal conditions of women's lives. Includes honors recitation.

WoSt 1002W. Politics of Sex. (3-4 cr)
Historical, cultural, psychological, sociopolitical dimensions of analyzing gender/sexuality.

WoSt 1003W. Women Write the World. (3-4 cr)
Concepts in literary studies. Poems, plays, short stories, novels, essays, letters by women from different parts of world. Focuses on lives, experiences, and literary expression of women, including basic concepts of women's studies.

WoSt 1902. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics/description vary. See *Class Schedule*, *Course Guide*.

WoSt 1904. Freshman Seminar. (3 cr; A-F only)
Topics specified in *Class Schedule*.

WoSt 3001W. Sexuality Studies. (3 cr)
Interdisciplinary survey of lesbian, gay, bisexual, and transgender studies. Includes honors recitation.

WoSt 3002. Race, Class, Ethnicity: Women's Lives in the United States. (3-4 cr)
Comparative study of women/gender, race, class, and sexuality in two or more U.S. ethnic cultures. Includes honors recitation.

WoSt 3002H. Honors: Race, Class, Ethnicity: Women's Lives in the United States. (3-4 cr. §3002. Prereq–Honors)
Comparative study of women/gender, race, class, sexuality in two or more U.S. ethnic cultures. Includes honors recitation.

WoSt 3003V. Honors: Gender and Global Politics. (3-4 cr. §3003W. Prereq–Honors)
Similarities/differences in women's experiences throughout world from cross-cultural/historical perspective. Uses range of reading materials/media (feminist scholarship, fiction, film, news media, oral history, autobiography). Includes honors recitation.

WoSt 3003W. Gender and Global Politics. (3-4 cr)
Similarities/differences in women's experiences throughout world from cross-cultural/historical perspective. Uses range of reading materials/media (feminist scholarship, fiction, film, news media, oral history, autobiography). Includes honors recitation.

WoSt 3004V. Honors: Point/Counterpoint: Contemporary Feminist Debates. (3-4 cr. §3004W. Prereq–Honors)
Contemporary debates of concern to many women. Abortion, affirmative action, marriage rights, welfare rights, sex education, children's rights, date rape. In-depth study of several issues. Debate pros/cons of relevant perspectives. Includes honors recitation.

WoSt 3004W. Point/Counterpoint: Contemporary Feminist Debates. (3-4 cr)
Contemporary debates of concern to many women. Abortion, affirmative action, marriage rights, welfare rights, sex education, children's rights, date rape. In-depth study of several issues. Debate pros/cons of relevant perspectives. Includes honors recitation.

WoSt 3051. Honors: Introduction to Sexuality Studies. (4 cr; A-F only. §3001)
Interdisciplinary survey of lesbian, gay, bisexual, and transgender studies. Recitation.

WoSt 3052. Honors: Introduction to U.S. Ethnic Studies of Women, Race, and Class. (4 cr; A-F only. §3002)
Comparative study of women and gender, race, class, and sexuality. Compares two or more U.S. ethnic cultures. Recitation.

WoSt 3053. Honors: Introduction to Women and World Cultures. (4 cr; A-F only. §3003)
Focuses on similarities/differences in women's experiences throughout world from cross-cultural/historical perspective. Uses range of reading materials and media (e.g., feminist scholarship, fiction, film, news media, oral history, autobiography). Recitation.

WoSt 3054. Honors: Point/Counterpoint—Introduction to Contemporary Feminist Debates. (4 cr; A-F only. §3004)
In-depth study of contemporary debates/perspectives on several issues of concern to many women. Issues may include abortion, affirmative action, marriage rights, welfare rights, sex education, children's rights, date rape. Recitation.

WoSt 3102V. Honors: Feminist Thought and Theory. (3-4 cr. §3102, §3102W)
Feminist theoretical perspectives. How theory develops in response to traditions/forms of practice.

WoSt 3102W. Feminist Thought and Theory. (3-4 cr)
Feminist theoretical perspectives. How theory develops in response to traditions/forms of practice.

WoSt 3190. Topics: Methods of Inquiry. (3 cr [max 12 cr])
Topics specified in *Class Schedule.*

WoSt 3201. Sociology of Gender. (3 cr. Prereq–1001 or 1002 or 3001 or 3002 or #)
Organization, culture, and dynamics of gender relations. Gender/racial inequalities in workplace. Relationships between gender/race, gender/culture. Sexuality, gendered politics, women's movement.

WoSt 3202. Biology of Women. (4 cr)
Biological aspects of female life from early development to old age. Biology of sex differences/sexuality, menarche/menstrual cycles, gestation/parturition, female-specific diseases/conditions, menopause/aging. Ways of knowing biology of female body. Includes lab.

WoSt 3202H. Honors: Biology of Women. (4 cr)
Biological aspects of female life from early development to old age. Biology of sex differences/sexuality, menarche, gestation/parturition, female-specific diseases/conditions, menopause. Ways of knowing biology of female body. Includes lab.

WoSt 3203W. Skin, Sex, and Genes. (3 cr. Prereq–3202)
Ways in which modern biology has been site of conflict about race/gender. Race/gender demographics of scientific professions.

WoSt 3204. Women's Psychologies: Feminist and Multicultural Perspectives. (3 cr)
Examines culture, gender, ethnicity, class, sexual identity, and age as factors that influence women's diverse psychologies.

WoSt 3205. A Sense of Identity. (3 cr)
Exploration of social and psychological factors that affect a woman's continuously developing sense of identity. Emphasis is on assertion and communication skills development.

WoSt 3206. Women and Madness in History and Literature. (3 cr. §5203. Prereq–Jr)
The representation of madness and how it intersects with gender as well as class, race, sexual orientation, and nationality.

WoSt 3290. Topics: Biology, Psychology, and Social Perspectives:. (3 cr)
Topics specified in *Class Schedule.*

WoSt 3301W. Anglophone Women Writers. (3 cr. Prereq–Intro literature course)
Literature in various genres (e.g., novels, short stories, poems, essays, plays, autobiography) written by women of various racial/ethnic backgrounds.

WoSt 3302. Women and the Arts. (3 cr)
Study of women in the arts, as represented and as participants (creators, audiences). Discussion of at least two different art forms and works from at least two different U.S. ethnic or cultural communities.

WoSt 3303W. Writing Differences: Literature by U.S. Women of Color. (3 cr)
Interpret/analyze poetry, fiction, and drama of U.S. women minority writers. Relationship of writer's history, ethnicity, race, class, and gender to her writings.

WoSt 3305. Language and Gender. (3 cr)
Gender and communication with an emphasis on interdisciplinary theory. Role of communication in creating, maintaining, reinforcing, and sometimes changing gender relations in society.

WoSt 3306. Pop Culture Women. (3 cr)
Contemporary U.S. feminism as political/intellectual movement. Ways in which movement has been represented in popular culture.

WoSt 3307. Feminist Film Studies. (3 cr)
Construction of different notions of gender in film, social uses of these portrayals. Lectures on film criticism, film viewings, class discussions.

WoSt 3308W. Women's Contemporary Fiction. (3 cr)
Themes and features of style and content related to changes in women's roles in novels and short stories by English-language women writers of the late 20th century. Significance of race, sexual orientation, class, and age in the conditions of women's lives and their portrayal in literature.

WoSt 3390. Topics: Literature, Film, and the Arts. (3-4 cr)
Topics specified in *Class Schedule.*

WoSt 3401W. Gender and Geopolitics. (3 cr)
Gendered theory and practice of geopolitics. Critique of the gendered nature of conventional international relations theory.

WoSt 3403W. Jewish Women in the United States. (3 cr)
Twentieth century American Jewish women—historically, sociologically, religiously, and culturally; key developments over the century.

WoSt 3404. International Lesbian and Queer Studies. (3 cr. Prereq–1001 or 1002 or 3001 or #)
Lesbian/gay lives throughout world. Culturally-specific/transcultural aspects of lesbian/gay identity formation, political struggles, community involvement, and global networking. Lesbian/gay life in areas other than Europe and the United States.

WoSt 3405. Latin American Women's Lives. (3 cr. Prereq–1001, 1002 or 1003 or LAS 3131 or #)
An interdisciplinary approach to understanding women's lives in Latin America. Use of ethnography, history, poetry, fiction, and "testimonio" to understand the conditions of women's lives in Latin America.

WoSt 3406. Gender, Labor, and Politics. (3 cr)
Historical changes in women's labor force participation in the United States from 1890 to present. Systematic/institutional processes that maintain/reproduce sex segregation. Women's efforts to change their work situations.

WoSt 3407. Women in Early and Victorian America, 1600-1890. (3 cr)
Varied experiences of women in American history from European settlement in North America to the end of the 19th century.

WoSt 3408. Women in Modern America. (3 cr. Prereq–3407)
History of women in the United States from 1890 to the present. Women's changing roles in politics, in the labor force, in the family, and in the popular culture. Themes include work, family, sexuality, gender ideologies, women's right struggles, and the different experiences of women based on race, class, religion, and region.

WoSt 3409W. Asian American Women's Cultural Production. (3 cr)
Diversity of cultures designated "Asian American." Understanding women's lives in historical, cultural, economic, and racial contexts.

WoSt 3410. La Chicana. (3 cr)
Focus on Chicanas or politically defined women of the Mexican-American community. Method is interdisciplinary emphasizing the importance of historical context and cultural process to any discussion of the Chicana experience.

WoSt 3411. Las Mujeres. (3 cr)
Focus on Chicanas; women of the Mexican-American community. Exploration of racial, economic, political, and gender issues of concern to all Mexican Americans and diverse Latino cultures.

WoSt 3414. Women in Medieval Europe. (3 cr; A-F only. §Hist 3614W)
Women's role in family, politics, religion, work, and social movements. Representations of women in religious texts, art, literature, scientific studies, and law. Methods/approaches to study of women's history.

WoSt 3490. Topics: Comparative and Global Studies. (3 cr)
Topics specified in *Class Schedule.*

WoSt 3501. Community, Service, and Self: Dynamics of Gender, Race, and Class. (3 cr. Prereq–[WoSt major or WoSt minor or 6 cr WoSt] or [#, Δ])
Combines theoretical exploration of models of community service with hands-on involvement in local communities.

WoSt 3502. Community, Service, and Self: Dynamics of Gender, Race, and Class. (3 cr. Prereq–3501)
Year-long, six-credit offering (with WoSt 3501) that combines a theoretical exploration of models of community service with hands-on involvement in local communities.

WoSt 3590. Topics: Civic and Community Studies. (3 cr)
Topics specified in *Class Schedule.*

WoSt 3880H. Honors Directed Instruction. (1-8 cr [max 12 cr]. §3880)
Directed instruction.

WoSt 3890H. Topics: Honors Seminar. (1-8 cr [max 12 cr]. §3890. Prereq–Honrs)
Topics vary. Topics that students would like faculty to develop into a course or topics closely related to faculty research/scholarship or contemporary issues.

WoSt 3893H. Honors Directed Study. (1-8 cr [max 12 cr])
Honors directed study.

WoSt 3894H. Honors Directed Research. (1-8 cr [max 12 cr])
Honors directed research.

WoSt 3980. Directed Instruction. (1-12 cr [max 12 cr]. Prereq–#, Δ, ❑)

WoSt 3993. Directed Study. (1-12 cr [max 12 cr]. Prereq–#, Δ, ❑)

WoSt 3994. Directed Research. (1-12 cr [max 12 cr]. Prereq–#, Δ, ❑)

WoSt 4102. Women, Gender, and Science. (3 cr. Prereq–1001 or 1002 or 3102 or #)
Three intersecting themes analyzed from 1700s to the present: women in science, sexual and gendered concepts in modern sciences, and impact of science on conceptions of sexuality and gender in society.

WoSt 4103. Honors: International Feminist Theory. (3 cr. Prereq–[3102, 8 cr WoSt] or grad or #)
Western/nonwestern feminist theories in conversation. Historical, cultural, and political context. Relation of theory to activism.

WoSt 4103H. Honors: International Feminist Theories. (3 cr. Prereq–[3102, 8 cr WoSt] or grad or #)
Western/nonwestern feminist theories in conversation. Historical, cultural, and political context. Relation of theory to activism.

WoSt 4108W. Senior Seminar: Writing. (2 cr. Prereq–4107, WoSt sr, ¶4993 for 1 cr)
Writing seminar for the senior project. The writing process is studied and the project is completed under the supervision of the instructor and the faculty adviser.

WoSt 4109. Field Learning. (2 cr. Prereq–4107, ¶4993 for 1 cr)
For majors working on senior projects that involve an internship or learning practicum. Majors may substitute this course for WoSt 4108 (with simultaneous enrollment in WoSt 4993) to finish their senior project.

WoSt 4190. Topics: Methods of Inquiry. (3 cr. Prereq–Sr or grad or #)
Topics specified in *Class Schedule*.

WoSt 4201. The Older Woman: A Feminist Perspective. (3 cr. Prereq–12 cr in WoSt or substantial work in psych or soc sci)
Myths and realities surrounding conceptualizations of older women in public, private, personal, social, sexual, professional, and community interactions.

WoSt 4290. Topics: Biology, Psychology, and Social Perspectives. (3 cr. Prereq–Sr or grad or #)
Topics specified in *Class Schedule*.

WoSt 4301W. Women Writers of Africa and Latin America. (3 cr. Prereq–8 cr in WoSt or Latin American or African studies or #)
Contemporary women writers from Sub-Saharan Africa and Latin America, including the Spanish-speaking Caribbean. Fiction, poems, plays, and essays in light of gender relations, feminist theory, and the history of colonialism.

WoSt 4302H. Honors: Women's Personal Narratives. (3 cr. Prereq–3301 or 3302 or 3 cr literary studies or 3 cr AfroAm or #)
Literary autobiography, journals, travel narratives, essays, slave narratives, and ethnographies used to consider content of and methodological, theoretical, and aesthetic issues in constructing/producing women's experience.

WoSt 4390. Topics: Literature, Film, and the Arts. (3 cr. Prereq–Sr or grad or #)
Topics specified in *Class Schedule*.

WoSt 4401. Chicana/Latina Cultural Studies. (3 cr. Prereq–3002 or 3410 or 3411 or 3 cr Chicano studies or #)
Diversity of cultures called "Hispanic"; women in these cultures. Chicanas/Latinas living in United States or migrating from their home nations to United States.

WoSt 4402. Rebels, Radicals, and Revolutionaries: History of Western Feminisms. (3 cr)
Survey of main currents in history of western feminist thought, politics, and social movements from 1770s to present.

WoSt 4403. Queering Theory. (3 cr. Prereq–3001)
Lesbianism and lesbian identities as products of cultural practices, relations, and meanings that are historically specific/changing.

WoSt 4490. Topics: Comparative and Global Studies. (3 cr. Prereq–Sr or grad or #)
Topics specified in *Class Schedule*.

WoSt 4502. Women and Public Policy. (3 cr. Prereq–[Jr or sr] WoSt major or 9 cr [WoSt or pol sci or sociology] or #)
Public policy issues, processes, and histories as these affect women-, children-, and gender-related issues.

WoSt 4504. Women and the Legislative Process. (3 cr. Prereq–Jr or sr or grad student or #)
Current/historical roles, impacts, and interactions of women as legislators, constituents, and professional or citizen lobbyists in state/national legislatures. Unique contributions, issues, challenges of women. Ways in which gender is operative in legislative process.

WoSt 4505. Honors: Legislative Internship. (3 cr. Prereq–4504 or equiv or grad, Δ)
Discussion group and learning community for students working as interns for a Minnesota legislator during the year's legislative session.

WoSt 4590. Topics: Civic and Community Studies. (3 cr. Prereq–Jr or sr or grad)
Topics specified in *Class Schedule*.

WoSt 4900W. Women's Studies Seminar. (3 cr [max 12 cr]; A-F only. Prereq–WoSt major, junior or senior standing, or #)
Includes a component on research methods/writing. Capstone experience. Culminates in a 20-25 page paper.

WoSt 4980. Directed Instruction. (1-8 cr [max 12 cr])

WoSt 4993. Directed Study. (1-8 cr [max 12 cr])

WoSt 4994. Directed Research. (1-8 cr [max 12 cr])

WoSt 5101. Feminist Approaches to Ethnography. (3 cr)
Preparation for feminist ethnographic research in the social sciences. Using recent works by feminist ethnographers, focus is on the methods, politics, and ethics, as well as gender, race, class, and cross-cultural issues pertaining to fieldwork.

WoSt 5102. Feminist Approaches to History. (3 cr. Prereq–8 cr WoSt or grad or #)
Analysis and practice of feminist history. Theories, methods, and sources that address the interrelationship of gender, race, class, and sexuality.

WoSt 5103. Feminist Pedagogies. (3 cr. Prereq–Grad or #)
Theory and practice of feminist pedagogies by comparing and evaluating various multicultural feminist theories of education/teaching and the application of specific theories, techniques, and teaching strategies.

WoSt 5105W. Gendered Rhetoric of Science and Technology. (3 cr. Prereq–8 cr WoSt or grad or #)
How cultural gender roles are affected by science and technology as well as influence scientific and technological thinking and communication strategies.

WoSt 5106. The Cultural Construction of Sex, Gender, and Sexuality. (3 cr. Prereq–Feminist studies grad or 12 cr WoSt or #)
Investigation of Euro-American concepts of sex, gender, sexuality in representative texts and images from the 17th century to the present. Critical and source materials from literary and cultural studies, history, biology, anthropology, psychology, and sociology.

WoSt 5107. Gender, Culture, and Science. (3 cr)
Critical study of some of the major papers concerning the relations of gender and scientific inquiry produced in the past 20 years.

WoSt 5190. Topics: Methods of Inquiry. (3 cr)
Topics specified in *Class Schedule*.

WoSt 5201. Global Processes and the Politics of Sexuality. (3 cr. Prereq–12 cr WoSt or feminist studies grad student or #)
Comparative examination of the social construction of sexuality. Formal/informal norms/regulations, categories of deviance, representation of sex in the media/arts, role of sexuality in relation to agency/subjectivity.

WoSt 5202. Feminist Therapies. (3 cr)
Feminist and multicultural perspectives regarding therapy and other helping forms for women, including philosophy of feminist theory; feminist ethics in therapy; gender, sexual identity, race and class in therapy, and related topics.

WoSt 5203. Women and Madness in History and Literature. (3 cr. §3206. Prereq–Jr, 4 cr WoSt or #)
The representation of madness and how it intersects with gender as well as class, race, sexual orientation, and nationality.

WoSt 5290. Topics: Biology, Psychology, and Social Perspectives. (3 cr)
Topics specified in *Class Schedule*.

WoSt 5300. Communication and Gender. (3 cr; A-F only. Prereq–One women's studies course or #)
How gender affects verbal communication. Development of analytical skills through readings, exercises, research that raise awareness of the power of language and the influence of gender prescriptions.

WoSt 5390. Topics: Literature, Film, and Other Arts. (3 cr)
Topics specified in *Class Schedule*.

WoSt 5403. Chicana/Latina Feminisms. (3 cr. Prereq–8 cr WoSt and/or Chic or grad or #)
The historical and social development of Chicana and Latina feminisms in general and their various specific types.

WoSt 5404. Working Class Women's Cultures. (3 cr. Prereq–12 cr WoSt or #)
Myths and realities surrounding working class women and their cultures. Use sociological and literary material in an effort to learn about working class women and to hear their own voices.

WoSt 5405. Chicanas: Women and Work. (3 cr. Prereq–#)
Chicanas, their various relationships to family/community. Local, national, and global work forces. Questions/issues related to growing integration of world's systems of production.

WoSt 5490. Topics: Comparative and Global Studies. (3 cr [max 12 cr])
Topics specified in *Class Schedule*.

WoSt 5501. Women and the Law. (3 cr. Prereq–9 cr [WoSt or pre-law grad] or #)
Legal system as it relates to women: historical legal approach to issues related to constitutional rights of women.

WoSt 5505. Women and Indigenous Land Struggles. (3 cr. Prereq–8 cr WoSt and/or Chic and/or AmIn or #)
Representative land struggles by indigenous women from a critical race and gender perspective.

WoSt 5590. Topics: Civic and Community Studies. (3 cr [max 12 cr])
Topics specified in *Class Schedule*.

WoSt 5993. Directed Study. (1-12 cr [max 12 cr]. Prereq–#)

WoSt 5994. Directed Instruction. (1-12 cr [max 36 cr])

WoSt 5995. Directed Research. (1-8 cr [max 36 cr])

Wood and Paper Science (WPS)

Department of Wood and Paper Science

College of Natural Resources

WPS 1001. Wood and Paper Science Profession Orientation. (1 cr; S-N only)
How industry converts forest resources into products while protecting source of raw material.

WPS 1002. Application of Computer and Sensor Technology to Problems in Wood and Paper Science. (1 cr [max 2 cr]; S-N only)
How sensor/computer technologies are used to monitor/evaluate environmental conditions. Applications of common computer packages to problem solving. Word processing, spreadsheet, presentation/database applications are used for course exercises in building science or wood products marketing/manufacturing. Sensor technology: application in process control and in collection/analysis of data from field or laboratory sensors.

WPS 1301. Wood as a Raw Material. (3 cr; A-F only)
Physical/chemical nature of wood and wood fiber. Raw material requirements, manufacturing processes, product characteristics for principal forest products. World wood supply, consumption trends.

WPS 1302. Wood as a Raw Material. (3 cr. Prereq–#; cr not granted to CNR majors; distance learning)
Physical/chemical nature of wood and wood fiber. Raw material requirements, manufacturing processes, product characteristics for principal forest products. World wood supply, consumption trends.

WPS 1303. Wood Structure and Identification. (1 cr. Prereq–1301 or #)
Features of wood structure vital to identifying wood of various tree species. Physical properties of wood.

WPS 3305. Fundamentals of Lumber Grading. (1 cr. Prereq–[1301, 1303] or #)
History, development, and practical application of hardwood/softwood lumber grading methods.

WPS 3312. Building Materials Estimating. (1 cr. Prereq–3332)
Modern methods of estimating quantity, grade, specifications of building materials for light frame construction.

WPS 3332. Introduction to Residential Construction. (2 cr)
Housing/construction terminology, building materials/components. Design, construction, and sales process: basic building science concepts, blueprint reading, computer-aided design, construction site logistics.

WPS 3393. Directed Study. (1-3 cr [max 3 cr]. Prereq–#)
Opportunity to pursue projects not available through independent study or extra credit. In consultation with an adviser, students develop a prospectus and complete progress reports and a final report on the project.

WPS 3396. Industrial Internship (Industrial Assignment). (1 cr; A-F only. Prereq–WPS cooperative ed student)
Industrial work assignment in forest products cooperative education program. Evaluation based on formal report written by student at end of each semester of work assignment.

WPS 4200H. Honors Seminar. (1 cr; A-F only. Prereq–WPS upper div honors, #)
Current topics presented by faculty/students. Lecture/discussion.

WPS 4201. Wood Industry Tours. (1 cr. Prereq–1301, [jr or sr or #])
Five-day bus tour consisting of visits to at least 12 manufacturers representing broad cross section of wood-using industry.

WPS 4301. Statics and Engineering Mechanics. (3 cr. Prereq–1301 or #)
Basic mechanics, strength of materials.

WPS 4302. Wood Chemistry. (3 cr; A-F only. Prereq–2xxx organic chem course)
Occurrence, biosynthesis, structure, and chemistry of chief biopolymers. Related lower molecular weight components in woody tissues. Chemical/biochemical principles of pulping wood and bleaching pulp.

WPS 4303. Wood Deterioration and Preservation. (3 cr. Prereq–1301 or #)
Deterioration of wood and wood products by bacteria, fungi, insects, marine organisms, fire, and weathering. Methods of preservation, preservatives used. Lecture, lab.

WPS 4304. Wood Drying. (2 cr. Prereq–4309)
Materials, equipment, processes, technical considerations inherent in industrial drying of wood products. Lectures, lab exercises, plant visits.

WPS 4305W. Pulp and Paper Technology. (3 cr. Prereq–Jr or #)
Pulping processes, fiber refining/processing, paper manufacturing, fiber/paper properties, paper recycling. Water requirements, effluent treatment. Chemical/mechanical pulping, pulp preparation, secondary fiber, de-inking, wet end additives. Lab problems/exercises supplemented by lectures.

WPS 4306. Analysis of Production Systems. (2 cr. Prereq–1301 or #; 3301 recommended)
Engineering/economic analysis of manufacturing/distribution systems for wood-based products. Material balances, equipment selection, economic analysis, presentation techniques.

WPS 4307. Wood-Base Panel Technology. (3 cr. Prereq–[4301, 4309] or #)
Design, manufacture, properties, applications, and performance of structural/non-structural wood-based composite products.

WPS 4308. Wood Machining. (2 cr; A-F only. Prereq–1301, 1303)
History/fundamentals of wood machining processes. Analysis of tool/workpiece interaction. Effects on recovery efficiencies, tool wear, and surface condition. Application of wood processing systems/technologies. Lectures, demonstrations, field trips.

WPS 4309. Wood-Fluid Relationships. (2 cr. Prereq–1301 or #)
Moisture in wood, its relationship to density and specific gravity, shrinking/swelling, electrical properties, strength properties, thermoconductivity, absorption isotherms, dimensional stabilization, permeability, and diffusion.

WPS 4313. Pulp and Paper Unit Operations. (3 cr. Prereq–[4305, ChEn 4001, Math 2263, ME 3321, ME 3322] or #)
Application of principles of momentum, heat, and mass transfer to unit operations in pulp/paper industry. Fluid transport, filtration, sheet formation, sedimentation, drainage, pressing, heat exchange, evaporation, washing, bleaching, humidification/drying, chemical/energy recovery. Computer simulation of multiple-stage systems.

WPS 4314. Papermaking Processes and Process Engineering Laboratory. (3 cr. Prereq–4305, 4313, ChEn 4001, ME 3321, ME 3322)
Theory/practice of design/operation of paper machines and associated finishing/converting equipment. Experiments illustrate/apply principles of momentum, heat, and mass transfer. Operation/performance optimization of pilot-plant paper machine. Process engineering studies of industrial production systems.

WPS 4318. Pulp and Paper Process Simulation and Control. (3 cr. Prereq–4305, ChEn 4001, Math 2263, ME 3321, ME 3322, [paper sci/engineering sr or grad student])
Concepts, methodology, and tools in process simulation, process dynamics, and automatic process control.

WPS 4321. Material Science of Paper. (3 cr. Prereq–4301, 4305, ChEn 4001, Chem 3501, ME 3321)
Response of fibers subjected to various operations of papermaking processes. Mechanisms acting in stock preparation, refining, wet-end operations, web consolidation, and drying. Influences on fiber, pulp suspension, and paper properties. Challenges placed on end products by changing raw materials and requirements, including introduction of recycled pulp in paper products.

WPS 4322. Biological and Environmental Science of Paper. (2 cr. Prereq–[Jr or sr in] PS&E program or grad student or #)
Biological process technology as applied to raw materials, manufacture processes, and product performance in paper industry. Roles/uses of microorganisms/enzymes in pulp/paper improvements/problems. Environmental impacts related to air/water discharge from papermaking as reflected in major portions of a recent paper mill expansion.

WPS 4333. Systems Approach to Residential Construction. (2 cr)
Energy, moisture control, and indoor air quality in residential buildings. Design, construction, and operational aspects for providing energy efficiency, durability, and healthy environment. Interaction between moisture and wood products within building system.

WPS 4334W. Advanced Residential Building Science. (3 cr. Prereq–4301, 4303, 4333)
Building science theory, advanced applications for residential buildings. Focuses on heat/mass transfer.

WPS 4335. Building Testing and Diagnostics. (2 cr. Prereq–4333)
Theoretical basis for performance testing. Diagnostics applications for residential structures. Focuses on existing structures and retrofit/remedial applications. Digital differential pressure gauges, blower doors, airflow hoods/grids, duct pressure testing, infrared thermography. Hands-on sessions for equipment use, problem solving.

WPS 4355. Mechanics and Structural Design With Wood Products. (3 cr. Prereq–4301 or CE student)
Nature of mechanical properties of wood, design, and analysis of wood members/structures.

WPS 4359. Surface, Colloids, and Coating Processes. (4 cr. Prereq–4305, Chem 3501, ME 3321)
Principles of surface/colloid chemistry applied to basic problems in pulp/paper manufacturing operations and to product uses. Coating process and products (primarily paper). Theory, techniques, and procedures for formulating/applying coatings. Properties/uses of coated products.

WPS 4362W. Pulping and Bleaching. (3 cr. Prereq–4302, 4305, paper sci/engineering [jr or sr or grad student])
Chemistry/technologies in producing paper-making raw material. Focuses on wood pulping/bleaching, including non-wood fibers and recycled fiber materials.

WPS 4364. Process Engineering Design. (2 cr. Prereq–4305, 4306, 4313, ChEn 4001, ME 3321, ME 3322, paper sci/engineering sr)
Process engineering related problems, optimization/design of pulp/paper processes. Application of engineering principles. Process engineering studies of industrial production systems.

WPS 4401W. Forest Products Marketing. (4 cr; A-F only. Prereq–1301)
Marketing/selling forest products. Focuses on companies that distribute wood-based construction materials. Lecture, discussion, in-class role playing, case studies, guest presenters, field trips to local companies.

WPS 4405. Paper in Today's World. (2 cr. Prereq–4305, non-WPS major)
Students prepare teaching unit on pulp/paper for use in elementary school, junior high, or senior high school science class.

WPS 4406. Understanding Wood. (1 cr)
For woodworking professionals and serious craftspersons. Cellular structure of wood, identification of hardwoods and softwoods, interaction of water and wood. No prior technical training in wood properties is needed, although general experience with woodworking is helpful.

WPS 4411. Application and Performance of Wood-based Composites in Services. (2 cr; A-F only. Prereq–1301 or 4406 or #; intended for [forest products marketing/manufacturing professionals, architects, commercial/residential design engineers])
Physical/mechanical properties of composites. Composite applications/installations.

WPS 4491. Senior Topics (Independent Study). (1-4 cr. Prereq–CNR sr, #)
Independent study in student's area of interest.

WPS 4801H. Honors Research. (2 cr; A-F only. Prereq–WPS upper div honors, #)
First semester of independent research project supervised by faculty member.

WPS 4802H. Honors Research. (2 cr; A-F only. Prereq–WPS upper div honors, #)
Complete honors thesis. Oral report.

WPS 5402. Business Markets in the Forest Products Industry. (3 cr [max 3 cr]; A-F only)
How forest products companies sell to other businesses, how this differs from traditional consumer process. Emphasizes business marketing

communications, sales force management, organizational buying, partnering, e-commerce, globalization of business markets. Case studies, discussion, daily readings from course text, academic/industry publications.

Work, Community, and Family Education (WCFE)

Department of Work, Community, and Family Education

College of Education and Human Development

WCFE 1301. Introduction to Career and Technical Education Teaching. (2 cr; A-F only. Prereq–Occupationally certifiable individual)
Entry-level skills to function as a teacher. Philosophy of career/technical education, planning of instruction, instructional methods, student evaluation, working with students who have special needs, ancillary duties of career/technical education faculty. Emphasizes microteaching and feedback.

WCFE 3011W. Introduction to Technology and Public Ethics. (3 cr)
Nature of technology. Values, ethical issues related to technology. Technology and transformation of workplace, family, community life.

WCFE 3301. Philosophy and Practice of Career and Technical Education. (2 cr; A-F only)
Introduction to contemporary career/technical education. Purposes/goals, governance structure, historical perspectives, industry-education relationship, current education practices. Possible future trends and their implications. Development of a personal philosophy of career/technical education.

WCFE 3601. Student and Trainee Assessment. (2 cr; A-F only)
Developing tests of knowledge, affect, and processes for programs focused on instruction of skills associated with business/industry. Developing learning-progress reporting systems. Evaluating instructional effectiveness. Applying tests and other evaluation instruments to assess/report learning in business/industry and in career/technical education fields.

WCFE 3629. Course Development for Business and Industry. (2 cr; A-F only)
Designing instructional programs/courses focused on helping learners develop desired competence. Designing instruction for performance-based training and vocational/technical education. Developing course syllabus components that clarify broad course expectations. Developing academic/community-based elements that complement course goals.

WCFE 3661. Instructional Methods for Business and Industry. (2 cr; A-F only)
Theory/practice in instructional methods/techniques for career/technical education (CTE) instructors and for human resources and development (HRD) professionals. How to deliver instruction using various teaching methodologies, select appropriate methodologies, and plan for their delivery.

WCFE 3990. Special Topics for Undergraduates in WCFE. (1-4 cr [max 12 cr])
Course content varies by offering.

WCFE 4990. Special Topics: Professional Issues in WCFE. (1-4 cr [max 12 cr])
Course content varies by offering.

WCFE 5002. Thinking, Learning, and Teaching in Work, Community, and Family. (3 cr; A-F only)
Nature of thinking/learning in everyday life contexts of family, work, community. Theory/practice relevant to stimulating/supporting thinking/learning in/for these contexts.

WCFE 5011W. Technology and Public Ethics. (3 cr; A-F only)
Nature of technology. Values, ethical issues related to technology. Technology and transformation of workplace, family, community life. Critique of technology.

WCFE 5021. Learning Through Service. (3 cr)
Service as both a philosophy and method of learning. Content covers both the theory and the practice of service in school-based and community-based organizations.

WCFE 5031. Information Resources in Education. (3 cr; S-N only)
Sources of knowledge and search strategies for accessing library, electronic, institutional, and informal resources of interest to educators.

WCFE 5101. Introduction to Leadership and Administration of WCFE. (3 cr)
Basic concepts of finance, public relations, communications, legal aspects, leadership, personnel policies and management, program planning and development, evaluation, and interinstitutional collaboration of work, community, and family education programs in school-based settings.

WCFE 5102. Leadership in WCFE. (2 cr)
An introduction to the concepts of leadership, leadership roles and responsibilities, and application to work, community, and family education settings.

WCFE 5121. Principles of Supervisory Management. (3 cr)
Introduction to the principles of supervision in education, business, industry, government, and service organizations.

WCFE 5125. Critical Pedagogy. (3 cr; S-N only)
Examination of critical pedagogy; critique of power relations regarding race, culture, class, gender, and age in various educational settings; consideration of improved practice in education for children, youth, and adults.

WCFE 5131. Planning WCFE. (3 cr)
Examination of educational planning and evaluation of work, community, and family education in formal and nonformal settings.

WCFE 5141. Evaluation of WCFE. (3 cr)
Designing and conducting project, program, and systems evaluations in work, community, and family education contexts and settings.

WCFE 5201. Family and Work Relationships. (3 cr; A-F only)
Examination of the interactions of work and family to prepare professionals to improve work and family relationships.

WCFE 5301. Philosophy and Practice of Career and Technical Education: Advanced. (2 cr; A-F only)
Purposes/goals of contemporary career/technical education. Governance structure, historical perspectives, industry-education relationship, current education practices. Possible future trends and their implications. Development of a personal philosophy of career/technical education.

WCFE 5331. Coordination Techniques for Work and Community Education. (3 cr)
Purposes of cooperative work and community education; responsibilities of instructor coordinator; guidance, selection, placement, supervision and evaluation of students; articulation of related instruction; training sponsor identification, orientation, development, and evaluation; management of the program.

WCFE 5341. Global Program Delivery Techniques and Technology. (2 cr; A-F only)
Special educational activities and teaching and communications methods and techniques for youth and adults, ranging from outreach to extension services, with an emphasis on youth and adult education programs in different global settings.

WCFE 5351. Methods for Change in Developing Countries. (3 cr; A-F only)
Sociological and cultural parameters as they pertain to promoting the adoption of improved practices in rural, community, and agricultural development, including formal and informal education institutions. Project planning, implementation, and evaluation related to actual change and development situations in developing countries.

WCFE 5400. Special Topics in Youth Development Leadership. (1-4 cr [max 4 cr])
An examination of important social and political topics of current interest to youth development practitioners with an emphasis on leadership implications for practice in youth agencies, congregations, schools, and other community settings. Content varies by offering.

WCFE 5411. The Everyday Lives of Youth. (3 cr; A-F only)
Lived realities of body, time, space, other, and self from an existential and phenomenological perspective.

WCFE 5412. Experiential Learning: Theory and Practice. (3 cr; A-F only)
Examines the theory and practices of learning by doing. Emphasis on the educator's personal engagement in the actual process to understand the technical, motivational, and evaluative aspects of experiential learning.

WCFE 5413. Organizational Approaches to Youth Development. (3 cr; A-F only)
Language, historical influences, and educational philosophies fundamental to youth development work in organizations serving youth.

WCFE 5414. Issues in Youth Development Leadership. (3 cr; A-F only)
An examination of issues that drive the professional practice of community-based youth work. Participants engage experts from the family, community, schools, and workplace to develop a deeper understanding of how public issues and policy affect the everyday lives of youth.

WCFE 5451. Seminar: Youth Development Leadership. (1-4 cr [max 4 cr]; S-N only. Prereq–Youth Development Leadership student or #)
Applies principles of healthy youth development, nonformal learning venues, and experiential education to practice/policies of community-based youth work. Individual/group projects focus on applied research, community-based teaching/learning, and foundations of ethical practice. Four-course sequence.

WCFE 5496. Leadership Field Experience: Youth Development. (4 cr; S-N only)
Leadership in support of healthy youth development. Work in agency dedicated to community-based youth programming, education, public policy; advocacy for children, youth, families.

WCFE 5511. Education for Work. (3 cr)
Examination of contextual bases underlying education for work; implications for practice.

WCFE 5521. School-to-Work Policies. (3 cr)
Examination of the aims and purposes, federal and state policies, educational reform, and issues and concepts relating to school-to-work education.

WCFE 5522. School-to-Work Practices. (3 cr)
Examination of learning in context; curricular integration; educational system articulation; educational partnerships; best practices in school-based, work-based, service-based learning, and connecting activities; building community support; and leadership relating to school-to-work education.

WCFE 5601. Student and Trainee Assessment: Advanced. (2 cr; A-F only)
Developing learning progress reporting systems and tests of knowledge, affect, and processes for programs focused on instruction of skills associated with business/industry. Evaluating instructional effectiveness. Applying tests and other evaluation instruments to assess/report learning in business/industry and career/technical education fields. Students develop each type of test and an overall evaluation plan for a course.

WCFE 5629. Course Development for Business and Industry: Advanced. (2 cr; A-F only)
Designing instructional programs/courses that help learners develop desired competence. Designing instruction for performance based training and vocational/technical education. Developing course syllabus components that clarify course expectations. Developing academic/community-based elements that complement course goals. Reflect on and compare performance-based instruction with other curriculum models for the field.

WCFE 5661. Instructional Methods for Business and Industry Education: Advanced. (2 cr. §BIE 5661, §HRD 5661)
Theory/practice in instructional methods for career/technical education (CTE) instructors and human resources/development (HRD) professionals. How to select various teaching methods and plan for their delivery. Preparing an instructional methods plan to clarify course content, teaching methods selected, rationale for their selection, and how a student organization might facilitate student learning.

WCFE 5696. Teaching Internship: Introduction. (1 cr; S-N only. Prereq–Admission to an init lic program)
Initial experiences in the teaching profession provided through observations of school organization and administration, seminars, relationship building with cooperating teachers, and a reflection on personal involvement as a beginning student teacher.

WCFE 5697. Teaching Internship: School and Classroom Settings. (2 cr. Prereq–5696 for init lic program)
Part-time supervised teaching experience in a school. Seminars on managing student's learning in the context of work, community, and family education programs in contemporary schools and on becoming a reflective educator.

WCFE 5698. Teaching Internship. (3-8 cr [max 8 cr]. Prereq–Admission to an init lic program)
Teaching experience in a school system that provides programs for grades 5-12.

WCFE 5699. Teaching Internship: Extended Practice. (1 cr. Prereq–5698)
Extended student teaching experience in a school system that provides programs for grades 5-12.

WCFE 5771. Teaching Entrepreneurship: Small Business Management. (3 cr)
Methods, organization, curriculum development and modification, and implementation of educational programs for entrepreneurs.

WCFE 5801. Educating Special Populations in Work, Community, and Family Settings. (3 cr)
Identifying and accommodating educational traits of students with disabilities and disadvantaging conditions in work, community, and family settings.

WCFE 5802. Interagency Collaboration for Special Populations in Work, Community, and Family Settings. (2 cr)
Interagency planning issues and practices relating to special populations for educational, business, and human service organization personnel, as well as family members and advocates.

WCFE 5803. Developmental Writing and the College Student: Theory and Practice. (3 cr. Prereq–Bachelor's degree)
Basic grounding in theory/practice of college-level developmental writing instruction. History of "basic writing," development of notions of "academic discourse," error/grammar in student writing, best classroom practices, current issues.

WCFE 5804. Research in Postsecondary Developmental Education. (3 cr. Prereq–Bachelor's degree, courses in [intro psychology, basic statistics])
Strategies for conducting three types of research that are central to developmental education: placement test validation, program evaluation, and classroom research. Students read examples and learn what constitutes best practices in each type.

WCFE 5821. Diversity Issues and Practices in Work, Community, and Family Settings. (3 cr)
Examination of the nature of diverse populations and their unique learning and training needs, exemplary programs, and collaborative efforts among persons representing work, community, and family settings.

WCFE 5822. Diversity and Organizational Transformation in Work, Community, and Family Education. (2 cr)
Developing models for understanding the impact of diversity on individual, organizational, and community outcomes; discussing organizational change in relation to diversity.

WCFE 5823. Program Planning and Improvement for Special Populations in Work, Community, and Family Education. (2 cr)
Concepts, issues, and practices related to the design, implementation, and evaluation of efforts focused on developing new programs or modifying existing programs for individuals with special learning needs in work, community, and family settings.

WCFE 5901. Using Research in Work, Community, and Family Education. (3 cr)
Introduction to the role of work, community, and family education research in professional practice, significant problems of practice for research, alternative modes of research, and synthesis and application of the results of research.

WCFE 5990. Special Topics in Work, Community, and Family Education. (1-4 cr [max 4 cr])
Topics vary.

WCFE 5993. Directed Study in WCFE. (1-4 cr [max 4 cr]. Prereq–Δ)
Self-directed study, with faculty advice, in areas not covered by regular courses.

Youth Development and Research (YoSt)

School of Social Work

College of Human Ecology

YoSt 2001. Introduction to Youth Studies. (2 cr)
Introduction to the issues of youth and adolescents in their everyday lives. Policies, programs, and services for youth and adolescents.

YoSt 2002. Introduction to Youth Studies: Understanding Youth, Young People, Youthhood, and Youth Work. (4 cr)
Introduces youth studies minor. Prepares students for more in-depth departmental offerings and for continued scholarship or later work with youth, directly or on their behalf.

YoSt 3001. Introduction to Youth, Youth Development, and Youth Work. (3 cr; A-F only. Prereq–Soc 1001, Psy 1001, 2001)
Framework, conceptual language for understanding youth, youth development, youth work. Formal/non-formal settings, types of work with youth that constitute youth work as a practice.

YoSt 3002. Observation Lab: Youth, Youth Development, and Youth Work. (1 cr; A-F only. Prereq–Soc 1001, Psy 1001, 2001, ¶3001, ¶3003)
Field observation of young people. Field visits to youth programs.

YoSt 3003. Bridging Theories, Research, Practices, and Observations about Youth Development and Youth Work. (1 cr; A-F only. Prereq–Psy 1001, Soc 1001, 2001, ¶3001, ¶3002)
Reflective seminar to carry out, at beginning level, guided reflection of one's/others' ideas, experiences, feelings about courses, self, youth work.

YoSt 3004. Youth in Community Context: Home, School, Neighborhood, Geography, Programs, Policies. (2 cr; A-F only. Prereq–3001, ¶3005, ¶3006)
Introduces community, sociocultural context of "growing up," "coming of age" as primary site for healthy youth development. Community introduced also as home to youth agencies/programs along intervention continuum. How community-based cultural identity, social expectations of young people frame young people's roles in school, work, neighborhoods.

YoSt 3006. Fieldwork Seminar: Youth, Youthworker, Context, Programs, Organizations, Place. (1 cr; A-F only. Prereq–3001, ¶3004, ¶3005)
Beginning youth work, youth agency, program, organization, service as found in students' youth work field experience.

YoSt 3007. Integrative Seminar: Analysis, Experience, Reflection on Youth Studies and Youth Work. (2 cr; A-F only. Prereq–3001, 3006)
Students integrate their two years of observation, analysis, experiences, and reflections about youth, youth work, youth programs. Work/career paths for beginning/advanced youth workers.

YoSt 3101. Introduction to Youth Work. (2 cr. Prereq–1 gen psy and 1 gen soc course)
Explore settings in which youth work is done: schools, informal education, juvenile justice, mental and physical health organizations, religious organizations. Key issues, policy and programmatic responses; philosophy, values, roles, tasks of youthworkers, and career patterns.

YoSt 4002. Constructing Personal Models of Youth Scholarship and Youth Work. (4 cr. Prereq–2002)
Integrates/ends University-wide undergraduate youth studies minor. Students analyze/reflect on youth studies minor course content, especially those models, theories, and concepts presented in 2002. Youth, young people, youthhood, youth work. Models, personal responds to youth. Occupational/vocational callings. Class discussion, written assignments.

YoSt 5031. Youth in the World. (3 cr. Prereq–Upper div AdPy course)
Encourages critical thinking about how youth as ideal and as lived reality are understood in scholarship, public discourse, and professional practice. Larger framework includes building a basis for understanding youth and working with or on behalf of youth.

YoSt 5032. Child and Adolescent Psychology for Practitioners. (3 cr. Prereq–courses in ed psych or child or adolescent psych)
Application of theory and research about children and adolescents including how findings can be used and how theories facilitate understanding of behavior.

YoSt 5101. Youth Work Practice I: Internship. (3 cr. Prereq–3101, 5032 or equiv, ¶5111, #)
First course of a sequential internship that includes 15 hours per week working with youth in a community youth-serving organization. Develop and enhance competence and identity as a youth worker, and reflect on and integrate knowledge about youth with on-going experience in youth work.

YoSt 5102. Youth Work Practice II: Internship. (3 cr. Prereq–5101, ¶5112, #)
Second course of a sequential internship that includes 15 hours per week of work with youth in a community youth-serving organization. Develop and enhance competence and identity as a youth worker, and reflect on and integrate knowledge about youth with ongoing experience in youth work.

YoSt 5111. Youth Work Methods I: Seminar. (1 cr. Prereq–3101, 5032 or equiv, ¶5101, #)
Weekly discussion seminar taken concurrently with 5101 to integrate theory and praxis with youth work experience. Written and experiential assignments to increase knowledge, competency, and skills related to working with youth.

YoSt 5112. Youth Work Methods II: Seminar. (1 cr. Prereq–5111, ¶5102, #)
Weekly discussion seminar taken concurrently with 5102 to integrate theory and praxis with youth work experience. Written and experiential assignments to increase knowledge, competency, and skills related to working with youth.

YoSt 5234. Youth Agencies, Organizations, and Youth Service System. (2 cr. Prereq–Two soc/anth courses, work exper in a youth agency or org)
Overview of major forms of youth agencies and organizations, sources of agency legitimacy, ideologies and values, and goals. Relations between and among agencies and organizations. Roles of adults and youth; professionals and nonprofessionals; paid staff and volunteers; youth participation; legal and ethical issues. Examples of existing and ideal agencies.

YoSt 5235. Community Building for Healthy Youth Development. (2 cr. Prereq–Two social sci courses, exper working with youth or #)
Community is a major context of adolescence and youth life, and community-building is a major strategy for healthy development. Explore recent foundation and government reports that address issues and practical problems of community-building.

YoSt 5240. Special Topics in Youth Studies. (2-8 cr [max 10 cr]. Prereq–Two social sci courses, exper working with youth or #)
In-depth investigation of one area of youth studies. Teaching procedure and approach determined by specific topic and student needs. Topic announced in advance.

YoSt 5241. Experiential Learning. (2 cr. Prereq–Two social sci courses, exper working with youth or #)
Cover rationale for and purposes of experiential learning in schools and youth-serving agencies, development and implementation of experiential programs for adolescents, and evaluation of experiential-learning programs. Each student will develop a plan for an experiential program for teenagers.

YoSt 5291. Independent Study in Youth Studies. (1-8 cr [max 8 cr]. Prereq–#)
Independent reading and/or research under faculty supervision.

YoSt 5301. Communicating with Adolescents About Sexuality. (2 cr. Prereq–Upper div AdPy course, exper working with youth or #)
Sexual development and experiences emphasizing how adults can be comfortable in communicating more effectively with young people. Sexual patterns, variations, roles, power, exploration, and sex education.

YoSt 5313. Direct Work with Adolescents. (2 cr. Prereq–Two social sci courses, exper working with youth or #)
Designed to give an understanding of direct work with troubled and at-risk adolescents in a wide range of settings where youth workers or social workers are typically involved. Emphasis on young people in groups in the "lifespace" in everyday life, rather than in one-to-one office-based interactions.

YoSt 5321. Work with Youth—Individual. (2 cr. Prereq–5032 or equiv or #)
Examination of basic assumptions underlying individual work with youth. Attention to special issues and concerns of adolescents and of persons who work with them, especially those who work with youth in one-to-one interactions.

YoSt 5322. Work with Youth—Families. (2 cr. Prereq–5321 or upper div AdPy course, family theory course or #)
Theories and techniques of working with youth and their families. Emphasis on practical methods of structural change, developing effective communication, decision-making and problem-solving systems, winning the family's cooperation; the role of the professional to influence healthy family development.

YoSt 5323. Work with Youth—Groups. (2 cr. Prereq–5321 or upper div AdPy course or #)
Increase knowledge and understanding of adolescent group needs and associations; increase knowledge of group process; and enhance skill in working with groups of adolescents in the community, in group living situations, and in group therapy.

YoSt 5402. Youth Policy: Enhancing Healthy Development in Everyday Life. (3 cr. Prereq–Two social sci courses, exper working with youth or #)
Youth policy is typically grounded to problems and risks and is specific to human services domains such as education, health, juvenile justice, employment, and the like. Create youth policy directed at enhancing healthy development through community building, program development, and other strategies.

This is the Faculty and Administration section of the 2002-2004 Undergraduate Catalog for the University of Minnesota, Twin Cities campus.

Faculty and Administration

* *Recipient of the Horace T. Morse-Minnesota Alumni Association Award for Outstanding Contributions to Undergraduate Education*

§ *Recipient of other teaching or advising award(s)*

University Regents

Maureen K. Reed, Congressional District 6, *Chair*
Robert S. Bergland, Congressional District 7, *Vice Chair*
Anthony R. Baraga, Congressional District 8
Frank R. Berman, At Large
Dallas Bohnsack, Congressional District 2
William E. Hogan II, Congressional District 3
Jean B. Keffeler, At Large
Richard McNamara, At Large
David R. Metzen, Congressional District 4
H. Bryan Neel III, Congressional District 1
Michael O'Keefe, Congressional District 5
Lakeesha K. Ransom, At Large

University Administrators

Mark Yudof, President
Robert Bruininks, Executive Vice President and Provost
Frank B. Cerra, Senior Vice President for Health Sciences
Tonya Moten Brown, Vice President and Chief of Staff
Carol Carrier, Vice President for Human Resources
Greg Fox, Interim Vice President for University Services
Sandra Gardebring, Vice President for University Relations
Robert Jones, Vice President for Campus Life and Vice Provost
Christine Maziar, Vice President for Research and Dean of the Graduate School
Charles Muscoplat, Vice President for Agricultural Policy
Mark B. Rotenberg, General Counsel

College of Agricultural, Food and Environmental Sciences

Administration

Charles C. Muscoplat, Dean of COAFES; Vice President of Agricultural Policy; and Director, Minnesota Agricultural Experiment Station

Philip O. Larsen, Senior Associate Dean of Research

Ann Hill Duin, Associate Dean for Academic Programs and Student Affairs

Michael A. Schmitt, Interim Associate Dean for Extension

Beverly Durgan, Associate Dean for Research and Outreach

John Vreyens, Director of International Agricultural Programs

Sara Nagel, Director, Career Services

Mark Bultmann, Director, Student Services

Stacie Dosdall, Admissions Coordinator

■ *Agricultural, Food, and Environmental Education*

Joerger, Richard, Assistant Professor
Ph.D., University of Minnesota
Teacher preparation, program planning, instructional design

Leske, Gary, Associate Professor
Ph.D., University of Minnesota
Experiential education, leadership, human research methods, lifework planning

Nordquist, Dale, Professor and Extension Educator
M.S., University of Minnesota
Agricultural finance, planning, farm business management education

*** Peterson, Roland, Professor and Division Head**
Ed.D., University of Nebraska
Teacher preparation, teaching methods, curriculum development, rural leadership

■ *Agronomy and Plant Genetics*

Anderson, James A., Associate Professor
Ph.D., Cornell University
Plant breeding and genetics—wheat

Anderson, Robert N., Professor Emeritus
Ph.D., University of Minnesota
Weed management/U.S. Department of Agriculture, Agricultural Research Service

Barnes, Donald K., Professor Emeritus
Ph.D., Pennsylvania State University
Plant breeding alfalfa

Becker, Roger L., Professor
Ph.D., Iowa State University
Weed control for forages, pastures, and non-cropland areas

Behrens, Richard, Professor Emeritus
Ph.D., University of Wisconsin
Weed management

Bernardo, Rex N., Associate Professor
Ph.D., University of Illinois
Plant breeding and genetics, corn

Burnside, Orvin C., Professor Emeritus
Ph.D., University of Minnesota
Alternative weed management systems

Busch, Robert H., Professor Emeritus
Ph.D., Purdue University
Wheat genetics and breeding methods

*** Cardwell, Vernon B., Professor**
Ph.D., Iowa State University
Undergraduate education and advising, crop management and physiology

Comstock, Vern E., Professor Emeritus
Ph.D., University of Minnesota
Plant breeding and genetics, flax

Cuomo, Gregory J., Associate Professor
Ph.D., University of Nebraska
Pasture management and ecology

Durgan, Beverly R., Professor
Ph.D., North Dakota State University
Weed management for small grains, sunflowers, minor crops

Ehlke, Nancy Jo, Professor
Ph.D., Pennsylvania State University
Forage, legumes and turf grasses, genetics, breeding methods, seed production

Falkner, Lori K., Assistant Professor
Ph.D., University of Wisconsin
Education and research, soybean breeding

Forcella, Frank, Associate Professor
Ph.D., University of Oklahoma
Integrated ecology and management of weeds

Garvin, David F., Assistant Professor
Ph.D., Cornell University
Wheat genetics and germplasm improvement

Geadelmann, Jon Lee, Adjunct Professor
Ph.D., Iowa State University
Corn breeding and genetics

Gengenbach, Burle G., Professor
Ph.D., University of Illinois
Corn and soybeans molecular genetics

Goodding, John A., Professor Emeritus
Ph.D., Washington State University
Agronomy—range plant ecology

Gronwald, John W., Professor
Ph.D., University of Illinois
Biological control of invasive weeds in legumes and wetlands

Gunsolus, Jeffrey L., Professor
Ph.D., North Carolina State University
Weed management in corn and soybeans

Hardman, Leland L., Professor
Ph.D., University of Minnesota
Production and utilization of crops, including biotechnology issues

Hicks, Dale R., Professor
Ph.D., University of Illinois
Corn and sunflower management

Johnson, Gregg, Associate Professor
Ph.D., University of Nebraska
Integrated weed management

Johnson, Herbert W., Professor Emeritus
Ph.D., University of Nebraska
Agronomy—soybean variety development

Jones, Robert J., Professor
Ph.D., University of Missouri
Maize physiology

Joo, Pilju Kim, Adjunct Professor
Ph.D., Cornell University
Crop genetics and international development

Jordan, Nicholas R., Associate Professor
Ph.D., Duke University
Application of plant population ecology to agricultural problems

Jung, Hans-Joachim G., Professor
Ph.D., University of Illinois
Cell wall lignification of forages

Lamb, JoAnn F., Associate Professor
Ph.D., University of Nebraska, Lincoln
Alfalfa breeding/genetics

Lueschen, William E., Professor
Ph.D., University of Illinois
Perennial native legumes and weed management in Canola

Marten, Gordon C., Professor Emeritus
Ph.D., University of Minnesota
Forage production and management
U.S. Department of Agriculture/ Agricultural Research Service

Muehlbauer, Gary J., Assistant Professor
Ph.D., University of Minnesota
Molecular genetics of wheat and barley

Naeve, Seth, Assistant Professor
Ph.D., Iowa State University
Soybean management

Oelke, Ervin, Professor Emeritus
Ph.D., University of Wisconsin, Madison
Small grains, wild rice and minor crops management

Orf, James H., Professor
Ph.D., University of Illinois
Soybean genetics and breeding

Peterson, Paul R., Assistant Professor
Ph.D., University of Minnesota
Forage management and utilization

Phillips, Ronald L., Regents Professor
Ph.D., University of Minnesota
Crop tissue culture, genomics and cytogenetics

Porter, Paul, Associate Professor
Ph.D., University of Illinois
Cropping systems

Rasmusson, Donald C., Professor Emeritus
Ph.D., University of California, Davis
Barley genetics and breeding

Rines, Howard W., Professor
Ph.D., Yale University
Genetics and biotechnology investigations in oat

Robinson, Robert E., Professor Emeritus
Ph.D., University of Minnesota
Agronomy and soil science

Sheaffer, Craig C., Professor
Ph.D., University of Maryland
Alfalfa and forage management, sustainable cropping systems

*** Simmons, Steve R., Professor**
Ph.D., University of Minnesota
Ecology of diversified cropping systems

Smith, Kevin P., Assistant Professor
Ph.D., University of Wisconsin, Madison
Barley genetics and breeding

Smith, Lawrence H., Professor Emeritus
Ph.D., Michigan State University
Undergraduate education

Somers, David A., Professor
Ph.D., Washington State University
Molecular genetics of soybean and oat

Stucker, Robert E., Professor Emeritus
Ph.D., North Carolina State University

Stuthman, Deon D., Professor
Ph.D., Purdue University
Durable pest resistance, oat genetics and breeding

Vance, Carroll P., Professor
Ph.D., Ohio State University
Physiology/ molecular biology of nitrogen fixation in legumes

Wedin, Walter F., Adjunct Professor
Ph.D., University of Wisconsin, Madison
Forage management

Wiersma, Jochum J., Assistant Professor
Ph.D., University of Minnesota
Small grains production and management

Wyse, Donald L., Professor
Ph.D., Michigan State University
Perennial weed control for grass/legume seed production

■ *Animal Science*

Arthaud, Raymond L., Professor Emeritus
Ph.D.
Beef cattle

Baidoo, Samuel L., Assistant Professor
Ph.D., University of Alberta
Swine nutrition and management

Berg, Robert W., Professor Emeritus
Ph.D.
Poultry

Boylan, William J., Professor Emeritus
Ph.D.
Sheep breeding

Chester-Jones, Hugh, Associate Professor
Ph.D., Virginia Tech
Dairy and beef production systems

Christians, Charles, Professor Emeritus
Ph.D., Oklahoma State University
Beef and swine genetics

Conlin, Bernard J., Professor Emeritus
Ph.D., University of Minnesota
Dairy management systems

Crabo, Bo G., Professor Emeritus
Ph.D., Royal Veterinary College, Stockholm, Sweden
Animal physiology of reproduction

Crooker, Brian A., Professor
Ph.D., University of Illinois
Nutritional physiology of ruminants

Da, Yang, Assistant Professor
Ph.D., University of Illinois, Urbana
Quantitative and molecular genetics

Dayton, William R., Professor
Ph.D., Iowa State University
Animal growth biology

DiCostanzo, Alfredo, Associate Professor
Ph.D., University of Minnesota
Beef cattle nutrition and management

Donker, John D., Professor Emeritus
Ph.D.
Ruminant nutrition

El Halawani, M.E., Professor
Ph.D., University of California, Davis
Avian endocrinology

Endres, Marcia, Assistant Professor
Ph.D., University of Minnesota
Dairy management

Fahrenkrug, Scott, Associate Professor
Ph.D., University of Minnesota
Functional genomics

Foster, Douglas N., Professor
Ph.D., University of California
Molecular biology, avian endocrinology

Grant, Ralph S., Professor Emeritus
Ph.D.
Dairy cattle management

Hamre, Melvin L., Professor Emeritus
Ph.D.
Poultry

*** Hansen, Leslie B., Professor**
Ph.D., Iowa State University
Dairy genetics

Hathaway, Marcia, Associate Professor
Ph.D., University of Minnesota
Muscle biology

Hawton, Jerry D., Professor
Ph.D., University of Minnesota
Swine nutrition

Head, William A., Assistant Professor
Ph.D., New Mexico State University
Sheep

*** Hunter, Alan G., Professor**
Ph.D., Michigan State University
Animal physiology

Jacob, Jacqueline, Assistant Professor
Ph.D., University of British Columbia
Poultry management

Johnson, Dennis G., Professor
Ph.D., University of Minnesota
Dairy production systems

Johnston, Lee J., Professor
Ph.D., Michigan State University
Swine nutrition and management

Jordan, Robert M., Professor Emeritus
Ph.D.
Sheep and horse management

Lamb, G. Cliff, Assistant Professor
Ph.D., Kansas State University
Reproductive physiology and beef cattle management

Linn, James Gary, Professor
Ph.D., University of Minnesota
Dairy nutrition

Marx, George D., Professor
Ph.D., University of Minnesota
Dairy management

Meiske, Jay C., Professor Emeritus
Ph.D.

Mudge, J. William, Professor Emeritus
Ph.D.
Dairy production

Noll, Sally L., Professor
Ph.D., University of Minnesota
Poultry (turkeys) science

O'Grady, Scott M., Professor
Ph.D., University of Illinois
Electrolyte physiology

Otterby, Donald E., Professor Emeritus
Ph.D., North Carolina State University
Dairy cattle nutrition and management

Ponce De León, F. Abel, Professor and Department Head
Ph.D., University of Massachusetts
Genome mapping, genetic markers

Rempel, William E., Professor Emeritus
Ph.D.
Swine genetics and breeding

Reneau, Jeffrey K., Professor
D.V.M., University of Minnesota
Dairy management

Rust, Joseph W., Professor Emeritus
Ph.D.
Calf nutrition

Seykora, Anthony J., Professor
Ph.D., North Carolina State University
Dairy genetics

Shoffner, Robert N., Professor Emeritus
Ph.D.
Poultry genetics

§ Shurson, Gerald C., Professor
Ph.D., Michigan State University
Swine nutrition management

Stern, Marshall D., Professor
Ph.D., University of Maine
Ruminant nutrition

Walker, Roger D., Professor
Ph.D., University of Kentucky
Swine management systems and swine breeding and genetics

Wheaton, Jonathan E., Professor
Ph.D., Oregon State University
Reproductive endocrinology

§ White, Michael E., Professor
Ph.D., University of Minnesota
Muscle biology and growth

Williams, Jesse B., Professor Emeritus
Ph.D.
Calf nutrition

Young, Charles W., Professor Emeritus
Ph.D.
Dairy cattle genetics

■ *Applied Economics*

Apland, Jeffrey D., Professor
Ph.D., Purdue University
Production economics, managerial economics and mathematics

Blank, O. Uel, Professor Emeritus
Ph.D., Michigan State University

Buhr, Brian L., Associate Professor
Ph.D., Iowa State University
Agricultural marketing and price analysis

Cochrane, Willard W., Professor Emeritus
Ph.D., Harvard University
Farm price analysis and policy

Coggins, Jay S., Associate Professor
Ph.D., University of Minnesota
Resource and environmental economics, political economy

Crewdson, Buddy G., Associate Professor Emeritus
M.S., University of Minnesota
Business development

Dahl, Dale C., Professor Emeritus
Ph.D., University of Minnesota
Agricultural marketing and price analysis, agricultural law

Dahl, Reynold P., Professor Emeritus
Ph.D., University of Minnesota
Agricultural marketing, futures markets and prices, agricultural cooperatives

Davis, Elizabeth E., Assistant Professor
Ph.D., University of Michigan
Labor economics, public policy, poverty, rural economics

Easter, K. William, Professor
Ph.D., Michigan State University
Resource economics and development, environment/non-point pollution

Egertson, Kenneth, Professor Emeritus
M.S., University of Minnesota

Eidman, Vernon R., Professor and Department Head
Ph.D., University of California, Berkeley
Production economics and agribusiness management

Fruin, Jeremiah E., Associate Professor
Ph.D., University of California, Berkeley
Transportation economics, agricultural marketing and logistics

Fuller, Earl I., Professor Emeritus
Ph. D., University of Minnesota
Farm management, production economics

Gartner, William, Professor
Ph.D., Michigan State University
Tourism development

Glewwe, Paul, Associate Professor
Ph.D., Stanford University
Development economics, applied microeconomics and econometrics

Hammond, Jerome W., Professor Emeritus
Ph.D., University of Wisconsin, Madison
Agricultural marketing and pricing

Hawkins, Richard O., Professor Emeritus
M.S., University of Minnesota
Production economics, farm management

§ Homans, Frances R., Associate Professor
Ph.D., University of California
Resource economics

Hoyt, John S., Professor Emeritus
Ph.D., American University of Washington

Hurley, Terrance M., Assistant Professor
Ph.D., Iowa State University
Agricultural production and policy, environmental economics

Kalambokidis, Laura, Assistant Professor
Ph.D., University of Michigan
Community and regional development, public finance

§ King, Robert P., Professor
Ph.D., Michigan State University
Management information systems, production economics, agribusiness management

Kinsey, Jean D., Professor
Ph.D., University of California, Davis
Consumption economics, retail food distribution

Lazarus, William F., Professor
Ph.D., University of Illinois
Farm business and financial management

Levins, Richard A., Professor
Ph.D., Mississippi State University
Farm management

§ Liu, Donald J., Associate Professor
Ph.D., University of Minnesota
Agricultural marketing and price analysis, futures and option

Maki, Wilbur R., Professor Emeritus
Ph.D., Iowa State University
Regional economics

Martin, Lee R., Professor Emeritus
Ph.D., Harvard University

McCullough, Gerard John, Associate Professor
Ph.D., Massachusetts Institute of Technology
Transportation economics and applied economics

Morse, George W., Professor
Ph.D., University of Wisconsin, Madison
Community and regional economics

Nefstead, Ward E., Associate Professor
M.S., University of Minnesota
Farm management and marketing

§ Olson, Kent D., Professor
Ph.D., Iowa State University
Production economics and farm management, agribusiness management

Pardey, Philip G., Professor
Ph.D., University of Minnesota
Agricultural research policy, economics of technical change

Parliament, Claudia D., Professor
Ph.D., University of California, Berkeley
Community economic development and economic education

Pederson, Glenn D., Professor
Ph.D., Michigan State University
Agricultural finance, international agricultural development

Polasky, Stephen, Professor and Fesler Lampert Professor
Ph.D., University of Michigan
Environmental and resource economics, industrial organization

Raup, Philip M., Professor Emeritus
Ph.D., University of Wisconsin
Land economics, world agricultural development

Roe, Terry Lee, Professor
Ph.D., Purdue University
Economic development, trade, political economy, prices

Rose, Gordon D., Professor Emeritus
Ph.D., South Dakota State University

Rudstrom, Margot, Assistant Professor
Ph.D., Purdue University
Production economics and agricultural marketing

Runge, Carlisle Ford, Distinguished McKnight Professor
Ph.D., University of Wisconsin, Madison
Agricultural and natural resources policy, welfare economics

Ruttan, Vernon, Regents Professor Emeritus
Ph.D., University of Chicago
Economic development, agricultural research policy and development

Schuh, G. Edward, Regents Professor
Ph.D., University of Chicago
Economic development, international trade and exchange rate policy

Senauer, Benjamin H., Professor
Ph.D., Stanford University
Consumption economics and food policy

Smith, Pamela, Associate Professor
Ph.D., University of Wisconsin, Madison
International trade, non-tariff barriers

Smith, Rodney B., Associate Professor
Ph.D., University of Maryland
Government regulation, policy and prices, resource and environment

Snyder, Robert W., Professor Emeritus
Ph.D., Cornell University

Stevens, Stanley C., Associate Professor Emeritus
Ph.D., University of Illinois
Grain marketing

Stinson, Thomas F., Associate Professor
Ph.D., University of Minnesota
Public finance and regional economic development

Sundquist, Wesley B., Professor Emeritus
Ph.D., Michigan State University
Production economics, policy

Taff, Steven J., Associate Professor
Ph.D., University of Wisconsin, Madison
Agricultural, resource, and environmental policy

Thomas, Kenneth H., Professor Emeritus
Ph.D., University of Minnesota
Farm management

§ Welsch, Delane E., Professor Emeritus
Ph.D., Michigan State University
International agriculture and rural development, natural resources

Yoho, Carole J. B., Associate Professor Emeritus
M.A., University of Minnesota
Public policy education, local government, public finance

■ *Biosystems and Agricultural Engineering*

In the following list, P.E. designates licensure as a professional engineer in Minnesota, unless otherwise indicated.

Bhattacharya, Mrinal, Professor
Ph.D., University of Nebraska
Food engineering, extrusion processing, starch/protein-based polymers

Boedicker, James, Adjunct Associate Professor
Ph.D., North Carolina State University
Machinery systems, machine safety, livestock environment

Chaplin, Jonathan, P.E., Associate Professor
Ph.D., Iowa State University
Machinery design, safety, precision farming machinery, computer-aided design

Clanton, Charles, P.E., Professor
Ph.D., University of Minnesota
Waste management: water, air quality, odor, and storage

Goodrich, Philip, P.E., Associate Professor
Ph.D., Purdue University
Odor control systems for animal waste, manure application

Iznuno, Forrest, Professor
Ph.D., Colorado State University
Water management, irrigation, drainage, water quality

Jacobson, Larry, P.E., Professor and Extension Engineer
Ph.D., University of Minnesota
Livestock housing, indoor air quality, waste management

Janni, Kevin, P.E., Professor, Extension Engineer, and Department Head
Ph.D., Purdue University
Livestock housing, odor control, air quality, biofiltration

Morey, R. Vance, Professor
Ph.D., Purdue University
Grain drying and storage, grain quality, machine vision

Nieber, John, P.E., Professor
Ph.D., Cornell University
Fluid flow, heat and contaminant transport in unsaturated soil

Ruan, Roger, Professor
Ph.D., University of Illinois
Food engineering, value-added processing, MRI (magnetic resonance imaging) and NMR (nuclear magnetic resonance) applications, non-thermal plasma

Sands, Gary, Assistant Professor and Extension Engineer
Ph.D., Colorado State University
Hydrology, water quality, water resources conservation and management

Shutske, John, Associate Professor and Extension Agricultural Safety Specialist
Ph.D., Purdue University
Agricultural safety and health, human factors, safety engineering design

Wilcke, William, P.E. (Iowa), Professor and Extension Engineer
Ph.D., Iowa State University
Post-harvest technology, sustainable agriculture, agricultural energy sources

Wilson, Bruce, P.E. (Oklahoma), Associate Professor
Ph.D., University of Kentucky
Hydrologic/water quality modeling, transport of surface water contaminants

Wright, Jerry, P.E., Associate Professor and Extension Engineer
M.S., North Dakota State University
Irrigation design and management, drainage, ground water quality

Zhu, Jun, Assistant Professor and Extension Engineer
Ph.D., University of Illinois
Waste management and treatment techniques, odor control

■ *Entomology*

Andow, David A., Professor
Ph.D., Cornell University
Insect ecology, evolution, conservation biology

Ascerno, Mark E., Professor and Department Head
Ph.D., Pennsylvania State University
Floricultural entomology, greenhouse biological control

Brooks-Wallace, Marion, Professor Emeritus
Ph.D., University of Minnesota
Insect physiology

Cannon, Colleen A., Assistant Professor
Ph.D., Virginia Polytechnic Institute and State University
Commodity and structural anthropod pest management

Chiang, Huai-Chang, Professor Emeritus
Ph.D., University of Minnesota
Insect ecology

Cutkomp, Laurence, K., Professor Emeritus
Ph.D., Cornell University
Insect toxicology

Fallon, Ann M., Professor
Ph.D., Queen's University
Molecular biology of insects, mosquito cell culture and reproduction

Ferrington, Leonard C., Associate Professor
Ph.D., University of Pittsburgh
Aquatic entomology

Harein, Phillip K., Professor Emeritus
Ph.D., Kansas State University
Stored product entomology

Heimpel, George E., Assistant Professor
Ph.D., University of California
Biological control, behavioral and evolutionary ecology

§ Holzenthal, Ralph W., Professor
Ph.D., Clemson University
Systematics, Cladistics Trichoptera

Hutchison, William D., Professor
Ph.D., University of Wisconsin, Madison
Integrated pest management for vegetable crops

Krischik, Vera A., Associate Professor
Ph.D., University of Maryland
Integrated pest management, ornamentals, plant resistance, biological control

Kurtti, Timothy J., Professor
Ph.D., University of Minnesota
Insect microbiology and physiology

MacRae, Ian V., Assistant Professor
Ph.D., Oregon State University
Integrated pest management (IPM) of field crops, site-specific IPM

Mesce, Karen A., Professor
Ph.D., University of Oregon
Neurobiology, behavior and neurohormones in arthropods and annelids

Moon, Roger D., Professor
Ph.D., University of California, Davis
Veterinary entomology, biological control, sampling

Noetzel, David M., Professor Emeritus
M.S., University of Minnesota
Field and specialty crops pest management

Ostlie, Kenneth R., Professor
Ph.D., Iowa State University
Corn and soybean integrated pest management

Peterson, Allan G., Professor Emeritus
Ph.D., University of Minnesota
Economic entomology

Price, Roger D., Professor Emeritus
Ph.D., University of Kansas
Systematics

Radcliffe, Edward B., Professor
Ph.D., University of Wisconsin, Madison
Integrated pest management: potato and alfalfa

Ragsdale, David W., Professor
Ph.D., Louisiana State University
Integrated pest management and biological control of insect

§ Spivak, Marla S., Associate Professor
Ph.D., University of Kansas
Apiculture and social insects

Venette, Robert C., Research Associate
Ph.D., University of California-Davis
Ecology

Walgenbach, David, Professor
Ph.D., University of Wisconsin
Agricultural entomology and pest management

Weller, Susan J., Associate Professor
Ph.D., University of Texas
Systematics of Lepidoptera using molecular and morphological approaches

■ *Food Science and Nutrition*

Addis, Paul B., Professor
Ph.D., Purdue University
Lipid oxidation, fatty acids, atherosclerosis, food chemical toxicology

Brady, Linda J., Professor
Ph.D., Michigan State University
Effects of diet on intestinal microflora and health

Csallany, A. Saari, Professor
D.Sc., University of Technical Science; Budapest, Hungary
Lipid chemistry, nutritional biochemistry, free radicals, oxidative degradation

Diez-Gonzalez, Francisco, Assistant Professor
Ph.D., Cornell University
Food-borne pathogens, mechanisms of survival in foods and environment, methods to prevent food contamination

Feirtag, Joellen M., Associate Professor
Ph.D., University of Minnesota
Food safety/HACCP, ATP bioluminescence, prebiotic/probiotic physiology

Fulcher, R. Gary, Professor and General Mills Land Grant Chair in Cereal Chemistry and Technology
Ph.D., Monash University
Structure/function relationships in cereal grains/cereal products

§ Gallaher, Daniel D., Professor
Ph.D., University of California, Davis
Diet/colon cancer relationships, fat/fiber in diet

Hassel, Craig A., Associate Professor
Ph.D., University of Arizona
Saturated fatty acids/dietary fiber on cholesterol metabolism

§ Kurzer, Mindy S., Professor
Ph.D., University of California, Berkeley
Dietary regulation of hormones, phytoestrogens, diet and cancer

***§ Labuza, Theodore P., Professor**
Ph.D., Massachusetts Institute of Technology
Shelf life/chemical deterioration of foods, moisture transport

*** McKay, Larry L., Professor**
Ph.D., Oregon State University
Food fermentations/genetics/ biotechnology of lactic acid bacteria

Metzger, Lloyd E., Assistant Professor
Ph.D., Cornell University
Evaluation of cheese functionality and manufacturing parameters

O'Sullivan, Daniel J., Associate Professor
Ph.D., University of College Cork, Ireland
Molecular genetics of lactic acid bacteria, bacteriophage resistance

Parks, Elizabeth J., Assistant Professor
Ph.D., University of California, Davis
Alternatives in glucose and fat metabolism in human disease states

Peterson, Carolyn M., Assistant Clinical Specialist
M.S., University of Minnesota
Dietetic education, sports nutrition

Reicks, Marla M., Associate Professor
Ph.D., Iowa State University
Diet/cancer prevention, nutrition education for low income groups

Reineccius, Gary A., Professor
Ph.D., Pennsylvania State University
Analysis of food flavors, losses during spray drying

Sapakie, Sidney F., Senior Fellow
M.B.A., University of Minnesota
Product development, food processing

Schafer, H. William, Associate Professor
Ph.D., University of Wisconsin, Madison
Food safety/quality, naturally occurring antimicrobial compounds/antioxidants

Schlegel, Gail J., Assistant Clinical Specialist
M.P.H., University of California, Los Angeles
Diabetes education, complementary health care, diet and chronic disease

Slavin, Joanne L., Professor
Ph.D., University of Wisconsin
Dietary fiber, diet/cancer/exercise, human feeding studies

Smith, Chery F., Assistant Professor
Ph.D., Indiana University
Domestic and international community nutrition issues

§ Smith, David E., Professor
Ph.D., University of Wisconsin
Effects of technology/new ingredients on dairy products

Tatini, Sita R., Professor
Ph.D., University of Minnesota
Control food-borne pathogens, use of natural antimicrobials

Vickers, Zata M., Professor
Ph.D., Cornell University
Pleasantness/acceptability of foods, attributes and food preferences

§ Warthesen, Joseph J., Professor and Department Head
Ph.D., Oregon State University
Chemical reactions in food/food analysis, processing/storage

■ *Horticultural Science*

Anderson, Neil O., Assistant Professor
Ph.D., University of Minnesota
Floriculture breeding and genetics

Ascher, Peter D., Professor Emeritus
Ph.D., University of Wisconsin, Madison
Genetics/floriculture

Becker, Roger L., Professor
Ph.D., Iowa State University
Weed management

Brown, Deborah L., Professor
M.S., University of Minnesota
Consumer horticulture, communications

Carter, John V., Professor Emeritus
Ph.D., Purdue University
Environmental stress

Cohen, Jerry D., Professor and Bailey Chair
Ph.D., Michigan State University
Plant biochemistry, cellular and molecular biology

Davis, David W., Professor Emeritus
Ph.D., Oregon State University
Vegetable breeding

Desborough, Sharon, Professor Emeritus
Ph.D., University of Wisconsin
Genetics

Eisel, Mervin, Professor Emeritus
M.Ed., University of Minnesota
Extension education—horticulture/ ornamentals

Erwin, John E., Associate Professor
Ph.D., Michigan State University
Floriculture

Fritz, Vincent, Associate Professor
Ph.D., Michigan State University
Vegetable physiology

§ Galatowitsch, Susan M., Associate Professor
Ph.D., Iowa State University
Landscape ecology

Gardner, Gary M., Professor
Ph.D., Harvard University
Growth regulation, plant hormones, photomorphogenesis

Gillman, Jeffrey H., Assistant Professor
Ph.D., University of Georgia
Nursery management

Hackett, Wesley P., Professor Emeritus
Ph.D., University of California, Davis
Ornamental horticulture—plant physiology

Hertz, Leonard B., Professor Emeritus
Ph.D., University of Wisconsin
Weed control, vegetable and fruit crops

Hokanson, Stan C., Assistant Professor
Ph.D., Michigan State University
Woody landscape plant breeding, stress physiology

*** Hoover, Emily E., Professor**
Ph.D., University of Minnesota
Fruit science, director of educational programs, Minnesota Landscape Arboretum

Horgan, Brian, Assistant Professor
Ph.D., University of Illinois
Turf

Lauer, Florian, Professor Emeritus
Ph.D., University of Minnesota
Potato breeding and genetics

Li, Pen Hsiang, Professor
Ph.D., Oregon State University
Environmental stress physiology and plant hardiness

Luby, James J., Professor
Ph.D., University of Minnesota
Fruit breeding and genetics

Markhart, Albert H., Professor
Ph.D., Duke University
Environmental physiology

McKinnon, Jane P., Professor Emeritus
M.S., University of Minnesota
Extension horticulture

Meyer, Mary Hockenberry, Associate Professor and Director, Master Gardener Program
Ph.D., University of Minnesota
Environmental horticulture

Mullin, Robert, Professor Emeritus
Ph.D., University of Minnesota
Ornamentals

Munson, Shirley T., Professor Emeritus
M.S., University of Minnesota
Horticultural food quality evaluation

Nylund, Robert E., Professor Emeritus
Ph.D., University of Minnesota
Vegetable physiology

Olin, Peter J., Professor
M.L.A., University of Massachusetts
Director of Minnesota Landscape Arboretum

§ Pedersen, Bradley W., Associate Professor
M.Ed., University of Minnesota
Turf, landscape design

Pellett, Harold M., Professor Emeritus
Ph.D., Iowa State University
Woody landscape, plant breeding

Rosen, Carl J., Professor and Interim Department Head
Ph.D., University of California, Davis
Soil fertility, plant nutrition

Smith, Alan G., Associate Professor
Ph.D., University of Florida
Molecular biology of plant development

Sowokinos, Joseph R., Professor
Ph.D., University of North Dakota
Potato physiology, carbohydrate metabolism

Stadelmann, Edward J., Professor Emeritus
Ph.D., University of Innsbruck
Plant physiology

Swanson, Bert T., Professor Emeritus
Ph.D., University of Minnesota
Nursery management

Thill, Christian A., Assistant Professor
Ph.D., University of Wisconsin, Madison
Potato breeding and genetics

Tong, Cindy B. S., Associate Professor
Ph.D., University of California
Postharvest physiology

White, Donald B., Professor
Ph.D., Iowa State University
Turf breeding, physiology, hardiness, and nutrition

Widmer, Richard E., Professor Emeritus
Ph.D., University of Minnesota
Floriculture

Wildung, David K., Professor
Ph.D., University of Minnesota
Physiology of fruits, vegetables, and potatoes

Zins, Michael E., Associate Professor
M.S., University of Minnesota
Extension horticulture, woody landscape plants

■ *Plant Pathology*

Anderson, Neil A., Professor Emeritus
Ph.D., University of Minnesota
Genetics of plant pathogens

Banttari, Earnest E., Professor Emeritus
Ph.D., University of Minnesota
Virus, mycoplasma diseases: potato and small grain diseases

Beckerman, Janna, Associate Professor and Extension Educator
Ph.D., Texas A&M University
Plant disease diagnosis

Blanchette, Robert A., Professor
Ph.D., Washington State University
Forest pathology, deterioration of wood products

Bradeen, James, Assistant Professor
Ph.D., University of Wisconsin, Madison
Potato diseases

Borlaug, Norman E., Professor Emeritus
Ph.D., University of Minnesota
1970 Nobel Peace Prize for the "Green Revolution"

Bushnell, William R., Professor
Ph.D., University of Wisconsin
Physiology of host-parasite relations

Chen, Senyu, Assistant Professor
Ph.D., University of Florida
Soybean cyst nematode control

Dill-Macky, Ruth, Associate Professor
Ph.D., University of Queensland
Small grains pathology

Groth, James V., Professor
Ph.D., University of British Columbia
Population genetics of plant pathogens

Herzfeld, Dean E., Associate Professor and Extension Educator
M.S., University of Minnesota
Chemical control, pesticide application training

Jones, Roger K., Professor
Ph.D., North Carolina State University
Diseases of small grains, sugar beets, and potatoes

Juzwik, Jennifer, Assistant Professor
Ph.D., University of Minnesota
Oak wilt, forest tree nursery diseases

Kinkel, Linda L., Professor
Ph.D., University of Wisconsin, Madison
Epidemiology and microbial ecology

Kolmer, James, Associate Professor
Ph.D., University of North Carolina
Cereal rust fungi, genetics of rust resistance in cereals

Kommedahl, Thor, Professor Emeritus
Ph.D., University of Minnesota
Biological control of root diseases, diseases of maize

Krupa, Sagar V., Professor
Ph.D., Uppsala University
Effects of air pollutants and global climate change on plants

Kurle, James E., Assistant Professor
Ph.D., University of Minnesota
Fungal diseases of plants

Larsen, Philip O., Professor
Ph.D., University of Arizona
Research administration

Leonard, Kurt J., Professor Emeritus
Ph.D., Cornell University
Epidemiology of cereal rust diseases

Lockhart, Benham E., Professor
Ph.D., University of California
Virus diseases, diagnostic technology

MacDonald, David H., Professor
Ph.D., Cornell University
Plant parasitic nematodes

Mircocha, Chester J., Professor Emeritus
Ph.D., University of Minnesota
Microbia/toxins and chemistry of host parasite relationships

Nyvall, Robert F., Professor
Ph.D., University of Minnesota
Diseases of cultivated wild rice, development of mychcohericedes

Percich, James A., Professor
Ph.D., Michigan State University
Plant disease management: wild rice and vegetables

Pfleger, Francis L., Professor and Department Head
Ph.D., Oregon State University
Vegetable and ornamental plants, ecology of VA (vesicular mycorrhizal fungi)

Powell, Jon F., Assistant Professor
Ph.D., Michigan State University
Etiology and management of turf grass diseases

Roelfs, Alan P., Professor Emeritus
Ph.D., University of Minnesota
Rusts of cereals, physiologic specialization

Samac, Deborah A., Associate Professor
Ph.D., University of Wisconsin, Madison
Molecular biology of host-parasite interactions

Steffenson, Brian, Associate Professor
Ph.D., University of California, Davis
Cereal disease research

Stetina, Sally, Assistant Professor
Ph.D., Louisiana State University
Soybean diseases

Stienstra, Ward C., Professor Emeritus
Ph.D., Michigan State University
Soybean corn turf and fruit disease management

Szabo, Les J., Associate Professor
Ph.D., Oregon State University
Molecular genetics of rust fungi

Windels, Carol E., Professor
Ph.D., University of Minnesota
Field crop diseases

Young, Nevin Dale, Professor
Ph.D., Yale University
Molecular genetics of plant disease resistance

Zeyen, Richard J., Professor
Ph.D., University of Minnesota
Physiological and molecular control of disease resistance

■ *Rhetoric*

Becker, Sandra, Professor and Extension Educator
M.A., Pennsylvania State University
Workplace writing, corporate video

Bekenkotter, Carol A., Professor
Ph.D., University of Iowa
Genre theory, rhetoric of science, qualitative research methodology

Bennett, J. Michael, Professor Emeritus
M.A.E., University of Florida
Reading and communication

Breuch, Lee-Ann Kastman, Assistant Professor
Ph.D., Iowa State University
Technical communication programs, computer pedagogy, writing instruction

Brown, James, I., Professor Emeritus
Ph.D., University of Colorado
Reading

Connolly, James E., Professor Emeritus
Ph.D., University of Minnesota
Speech and managerial communication

Crider, Janel Anderson, Assistant Professor
Ph.D., Purdue University
Distance education, computer-mediated communication, organizational communication

Duin, Ann Hill, Professor
Ph.D., University of Minnesota
Collaboration via emerging technologies, multimedia instruction and distance learning

Ferguson, Richard W., Professor Emeritus
Ph.D., University of Minnesota
American studies and technical writing

Gore, Warren Y., Professor Emeritus
M.A., University of Iowa
Speech and small group decision making

Graff, Richard J., Assistant Professor
Ph.D., Northwestern University
Rhetorical theory and practice, rhetorical criticism, classical rhetoric

Gross, Alan G., Professor
Ph.D., Princeton University
Rhetoric of science, scientific controversy, history of scientific article

Gurak, Laura J., Professor
Ph.D., Rensselaer Polytechnic Institute
Rhetorics of science and technology, internet studies, intellectual property

Holloway, James R., Professor Emeritus
D.D., Sioux Falls College
Speech

Horberg, Richard O., Professor Emeritus
Ph.D., University of Minnesota
Creative writing

Lay, Mary M., Professor
Ph.D., University of New Mexico
Rhetoric of midwifery, gender and technical communication

Logie, John, Assistant Professor
Ph.D., Pennsylvania State University
Rhetoric of electronic media, intellectual property, computer-mediated communication

Longo, Bernadette C., Assistant Professor
Ph.D., Rensselaer Polytechnic Institute
Cultural histories of technical communication, computer-assisted pedagogy

Marchand, William M., Professor
Ph.D., University of Minnesota
History of ideas, conflict between science and religion

McDowell, Earl E., Professor
Ph.D., University of Nebraska, Lincoln
Technical communication apprehension, technical communication, employment cycle interviewing

Mikelonis Victoria M., Professor
Ph.D., Indiana University of Pennsylvania
Intercultural communication, design of intercultural training materials

Nichols, Ralph G., Professor Emeritus
Ph.D., University of Iowa
Listening and speech

§ Pearsall, Thomas E., Professor Emeritus
Ph.D., University of Denver
Technical communication

Philippon, Daniel J., Assistant Professor
Ph.D., University of Virginia
Environmental rhetoric, history and ethics, nature writing

Savage, Edward B., Professor Emeritus
Ph.D., University of Minnesota
Literature/English

Scanlan, Thomas M., Associate Professor
Ph.D., University of Minnesota
Landscape as index to cultural values, the prairie in American life

Schuelke, L. David, Professor Emeritus
Ph.D., Purdue University
Organizational communication

Sullivan, Dale L., Professor and Department Head
Ph.D., Rensselaer Polytechnic Institute
History of rhetoric, rhetorical theory applications and technical communication

Wahlstrom, Billie J., Professor
Ph.D., University of Michigan
Design of distance learning materials, media selection

Walzer, Arthur E., Associate Professor
Ph.D., University of Minnesota
Rhetorical theory and criticism, 18th-century rhetorical theory

Wells, Donald E., Professor Emeritus
Ph.D.
Agricultural journalism

Wharton, W. Keith, Professor Emeritus
Ph.D., Colorado State University
Managerial communication

Wright, Eugene S., Professor Emeritus
Ph.D., University of Minnesota
Technical writing

■ *Soil, Water, and Climate*

Allan, Deborah L., Professor
Ph.D., University of California, Riverside
Management of roots and rhizosphere processes

Anderson, James L., Professor
Ph.D., University of Wisconsin, Madison
Sewage treatment, water quality, soil survey

Baker, Donald G., Professor Emeritus
Ph.D., University of Minnesota
Climatology

§ Bell, James C., Professor
Ph.D., Pennsylvania State University
Soil classification/survey, landscape analysis

Bloom, Paul R., Professor
Ph.D., Cornell University
Soil chemistry, environmental chemistry, soil mineralogy

Cheng, H. H., Professor Emeritus
Ph.D., University of Illinois
Soil biochemistry

*** Cooper, Terence H., Professor**
Ph.D., Michigan State University
Urban soils, turf grass, environmental education

Eash, Neal S., Assistant Professor
Ph.D., Iowa State University
Soil science

Graham, Peter H., Professor
Ph.D., University of West Australia
Soil biology

Griffis, Timothy J., Assistant Professor
Ph.D., McMaster University, Canada
Land-atmosphere interactions via flux measurements and energy exchange

Grigal, David F., Professor Emeritus
Ph.D., University of Minnesota
Forest vegetation, air pollutants, forest ecosystems, nutrients

Gupta, Satish Chander, Professor
Ph.D., Utah State University
Soil physics/management

Halbach, Thomas R., Professor
M.S., University of Wisconsin, Madison
Waste management/remediation

Hansen, Neil C., Assistant Professor
Ph.D., University of Minnesota
Soil physics, water quality

King, Jennifer, Assistant Professor
Ph.D., University of California, Irvine
Ecosystem ecology, earth system science

Lamb, John A., Professor
Ph.D., University of Nebraska, Lincoln
Agricultural production management systems, soil properties

Larson, William E., Professor Emeritus
Ph.D., Iowa State University

Malzer, Gary L., Professor
Ph.D., Purdue University
Nitrogen, precision agriculture, water quality

Molina, Jean A., Professor
Ph.D., Cornell University
Carbon and nitrogen transformations in soil

Moncrief, John F., Professor
Ph.D., University of Wisconsin, Madison
Soil physics/tillage

Mulla, David J., Professor and Endowed Chair for Soil and Water Resources
Ph.D., Purdue University
Water quality, precision agriculture, risk assessment

Munter, Robert C., Associate Professor Emeritus
M.S., University of Minnesota

§ Nater, Edward A., Professor and Interim Department Head
Ph.D., University of California, Davis
Soil genesis/clay mineralogy

Randall, Gyles, Professor
Ph.D., University of Wisconsin, Madison
Soil Science

Rehm, George W., Professor
Ph.D., University of Minnesota
Soil fertility, fertilizer management, water quality

Robert, Pierre C., Professor
Ph.D., University of Minnesota
Precision agriculture, land evaluation, decision support system

Rosen, Carl J., Professor
Ph.D., University of California
Soil fertility, horticultural crops

Rust, Richard H., Professor Emeritus
Ph.D., University of Illinois

Sadowsky, Michael J., Professor
Ph.D., University of Hawaii, Manoa
Environmental microbiology, biodegradation, nitrogen fixation, molecular biology

Schmitt, Michael A., Professor
Ph.D., University of Illinois
Fertilizer, nitrogen, manure

Seeley, Mark W., Professor
Ph.D., University of Nebraska, Lincoln
Climatology

Sims, Albert L., Associate Professor
Ph.D., North Carolina State University
Soil management

Strock, Jeffrey S., Assistant Professor
Ph.D., North Carolina State University
Soil management and fertility

Wang, Dong, Assistant Professor
Ph.D., University of Wisconsin, Madison
Soil environment and physics

College of Architecture and Landscape Architecture

Administration

Thomas Fisher, Dean

Lance Neckar, Associate Dean for Curriculum and Academic Affairs

Ann Mayhew, Assistant Dean for Administration

Janet Abrams, Director, Design Institute

Krista Bergert, Program Director, Continuing Professional Studies and External Relations

Susan Bretheim, Development Officer

Richard Schunn, Technology Director

Anne White, Director, Student Services

Faculty

In this faculty listing, R.A. designates licensure as a registered architect; R.L.A. designates licensure as a registered landscape architect; A.I.A. designates member, American Institute of Architects (a member of the A.I.A. must be a registered architect); F.A.I.A. designates fellow, American Institute of Architects; A.S.L.A. designates member, American Society of Landscape Architects; F.A.S.L.A. designates fellow, American Society of Landscape Architects; A.I.C.P. designates member by examination of the American Institute of Certified Planners; and P.E. designates licensure as a professional engineer.

■ *Architecture*

Adams, Robert, Adjunct Assistant Professor
M.Arch., Southern California Institute of Architecture
Design

Anderson, Lee, Associate Professor
M.Arch., University of Minnesota
Computer aids to design conception and presentation

Bergert, Douglas, Adjunct Instructor
M.Arch., Harvard University
Design

Berkovskaya, Olga, Adjunct Instructor
M.Arch., University of Minnesota
Representation

Buetow, Steve, Adjunct Instructor (A.I.A.)
B.Arch., University of Minnesota
Residential and historical architecture

Carmody, John, Senior Research Associate and Director, Center for Sustainable Building Research
M.Arch., University of Minnesota
Environmental technology, sustainable design

Caliandro, Victor, Adjunct Assistant Professor
M.S., Columbia University
Design, urban design

Chen, Arthur, Associate Professor
Ph.D., Georgia Institute of Technology
Architectural thinking, drawing, urbanism, design, representation theory

Cheng, Renee, Associate Professor
M.Arch., Harvard University
Design, technology

Christensen, Michael, Adjunct Instructor
M.Arch., University of Minnesota
Digital technology

Conway, William, Associate Professor and Department Head (A.I.A.)
M.Arch., Yale University
Design, theory, practice

deLaittre, Mary, Adjunct Instructor
M.Arch., University of Minnesota
Urban design, neighborhood development

Dimond, David, Adjunct Instructor (A.I.A.)
M.Arch., Virginia Polytechnic Institute and State University
Design, representation

Dittmar, Gunter, Associate Professor
M.Arch., Yale University
Architectural theory, design process, design

Dozier, James, Adjunct Instructor
B.Arch., Rice University
Digital technology, electronic imaging

Ebbighausen, Nina, Adjunct Instructor
B.Arch., Syracuse University
Design

Ferguson, Robert, Assistant Professor
M.Phil., Pembroke College of Cambridge
History and philosophy, design

Fisher, Thomas, Professor
M.I.S., Case Western Reserve University
Architectural criticism, writing/communication, design theory

Franck, Bruno, Adjunct Associate Professor
Ph.D., University of Minnesota
Architectural structure

Fuller, Timothy, Adjunct Assistant Professor
M.Arch., University of Minnesota
Urban design, residential design and construction

Ganapthy, Anjali, Adjunct Instructor
M.Arch., Virginia Polytechnic Institute
Design

Gilpin, Dawn, Adjunct Assistant Professor
M.Arch., Southern California Institute of Architecture
Design, representation

Good, Robert, Adjunct Instructor
M.Arch., University of Minnesota
Design

Guzowski, Mary, Associate Professor
M.Arch., University of Washington
Sustainable design, daylighting, environmental technology

Hadiyanni, Tasoulla, Adjunct Instructor
Ph.D., University of Minnesota
Design, housing

Heshmati, Ali, Adjunct Assistant Professor
B.Arch., University of Minnesota
Design

Jacques, Tracey, Adjunct Instructor (A.I.A.)
B.Arch., University of Minnesota
Representation

Jara, Cynthia, Associate Professor (R.A.)
M.A., M.Arch., Columbia University
Design theory: historic reference

LaVine, Lance, Professor and Director of Undergraduate Studies (R.A.)
M.Arch., M.C.P., University of Pennsylvania
Technology and design, elemental form, philosophical premises

Lew, Douglas, Adjunct Instructor
M.F.A., Bradley University
Watercolor

Mack, Robert, Adjunct Assistant Professor (F.A.I.A.)
B.Arch., University of Minnesota
Historic preservation and rehabilitation

Maki, Ann, Adjunct Instructor
M.Arch., University of Minnesota
Design

McGlaughlin, Richard, Adjunct Instructor
M.Arch., Arizona State University
Design

McQuade, Martha, Adjunct Instructor
M.Arch., University of Minnesota
Design, representation

Miller, Nancy, Lecturer
Ph.D., Penn State University
Architecture history

Mulfinger, Dale, Adjunct Professor (A.I.A.)
B.Arch., University of Minnesota
Architect Edwin Lundie, pattern language, design

Nelson, Ralph, Adjunct Assistant Professor
M.Arch., Columbia University
Design

Orton, Charles, Adjunct Instructor
M.Arch., Yale University
Representation

Parker, B. Aaron, Adjunct Assistant Professor (A.I.A.)
M.S., Columbia University
Architectural design, urban design

Piotrowski, Andrzej, Associate Professor (R.A.)
M.I.Arch., Politechnika Warszawska, Poland
Visual studies, design, theory

Porycky, Anna, Adjunct Instructor
M.Arch., University of Minnesota
Representation

Quigley, Timothy, Adjunct Assistant Professor (A.I.A.)
M.Arch., University of Minnesota
19th- and 20th-century architecture, design

Rhoades, Todd, Adjunct Associate Professor (R.A.)
M.Arch., Cranbrook Academy of Art
Art, design

Robinson, Julia, Professor (A.I.A.)
M.A., University of Minnesota
Housing, culture and architecture, design methods, representation

Rockcastle, Garth, Professor (F.A.I.A.)
M.Arch., Cornell University
Theory, urban design, professional ethics and practice

Roe, Sharon, Adjunct Assistant Professor
M.Arch., University of California, Berkeley
Design

Satkowski, Leon, Professor
Ph.D., Harvard University
Architectural history

Schulte, Marcy, Adjunct Assistant Professor (A.I.A.)
M.Arch., North Dakota State University
Design

Scott, Anthony, Adjunct Instructor
M.Arch., University of Virginia
Design

Singh, Virajita, Lecturer
M.Arch., University of Minnesota
Sustainable design, design

§ Solomonson, Katherine, Associate Professor
Ph.D., Stanford University
American and contemporary architecture

Springer, Mary, Lecturer
M.Arch., Rice University
Design, representation

Strothman, Susan, Adjunct Instructor
M.Arch., University of Minnesota
Structures, design

Thorbeck, Duane, Adjunct Professor (F.A.I.A.)
M.Arch., Yale University
Public buildings, interpretative architecture, urban/rural issues

§ Tollefson, Lee, Adjunct Associate Professor (A.I.A.)
M.Arch., University of Pennsylvania
Design practices, Native American architecture, monastic architecture

Valdes, Marcelo, Adjunct Instructor
M.Arch., University of Minnesota
Design

Watson, Gregory, Adjunct Associate Professor (R.A.)
M.Arch., Washington University
Design, representation, visual studies

§ Weeks, J. Stephen, Associate Professor (R.A.)
B.Arch., University of Minnesota
Construction materials and methods, masonry design, design

Weinstein, Joshua, Lecturer (R.A.)
B.Arch., Pratt Institute
Architectural and environmental design

Wentzell, Mark, Adjunct Assistant Professor (R.A.)
M.Arch., Syracuse University
Community, institutional, and educational design practice

Westbrook, Thomas, Lecturer
M.Arch., University of Minnesota
Representation

Widder, James, Adjunct Instructor
M.S., Massachusetts Institute of Technology
Design

Wilkins, Craig, Adjunct Associate Professor (R.A.)
M.R.E.U.P., Columbia University
Critical spatial theory, community design strategies, disciplinary social responsibility

Yoos, Jennifer, Adjunct Assistant Professor
M.Arch., University of Minnesota
Urban revitalization, contemporary cities, design

■ *Landscape Architecture*

Abbott, Dean, Adjunct Assistant Professor
M.L.A., Harvard University
Graphics, art of design

Agee, Bradley, Teaching Specialist
B.L.A., University of Minnesota
Design

Carlson, Mary Christine, Lecturer
M.L.A., University of Washington
Conservation design, public participation process

Clemence, Roger, Professor Emeritus
M.L.A., M.Arch., University of Pennsylvania
Art of design

Favour, Joseph, Lecturer
M.L.A., Harvard University
Construction technology

Flynn, Kathe, Lecturer
M.L.A., Harvard University
Design

Galatowitsch, Susan, Associate Professor
Ph.D., Iowa State University
Wetland restoration

Gunderson, Robert, Adjunct Assistant Professor (A.S.L.A., R.L.A.)
M.L.A., University of Pennsylvania
Construction technology

Hagstrom, Jim, Teaching Specialist
B.L.A., University of Minnesota
Design, planting design

Halunen, Todd, Teaching Specialist (A.S.L.A., R.L.A.)
B.L.A., North Dakota State University
Computer-aided design

Hewitt, Clinton, Associate Professor
M.L.A., Michigan State
Campus planning

Kopischke, Gregory, Teaching Specialist
B.L.A., University of Minnesota
Design for dwelling

Koepke, John, Associate Professor and Department Head (R.L.A.)
M.L.A., University of Washington
Graphics, Native American design issues

Krinke, Rebecca, Assistant Professor
M.F.A., Massachusetts College of Art
Art of design, sculpture

MacDonagh, Peter, Teaching Specialist
B.L.A., University of Minnesota
Ecological design

§ Martin, Roger B., Professor Emeritus (F.A.S.L.A., R.L.A.)
M.L.A., Harvard University
Design research, design education

Mikonowicz, Aaron, Lecturer
M.L.A., University of Minnesota
Design technology

Miller, Kristine, Assistant Professor
Ph.D., Edinburgh University, M.L.A., Cornell University
Public space design issues

Murphy, Richard, Jr., Adjunct Assistant Professor
M.L.A., Harvard University
Professional practice

§ Neckar, Lance, Professor (R.L.A.)
M.A., University of Wisconsin, M.L.A., Harvard University
Landscape architecture history and theory, urban design practice

Olin, Peter, Associate Professor (A.S.L.A., R.L.A.)
M.L.A., Cornell University
Director, Minnesota Landscape Arboretum
Design, horticultural issues

Pitt, David G., Professor (A.I.C.P.)
Ph.D., University of Arizona
Landscape perception, regional landscape research, GIS assessment

Shaw, Daniel, Adjunct Assistant Professor
M.L.A., University of Minnesota
Horticultural design

Sykes, Robert D., Associate Professor (A.S.L.A., R.L.A.)
M.L.A., Harvard University
Surface water and transportation systems, design theory

Vogel, Mary, Senior Research Fellow
M.Arch., University of Minnesota
Community design and development

Wong, Augustine, Lecturer (A.S.L.A., R.A.)
M.A.U.P., University of Washington
Urban design

■ *Design Center for American Urban Landscape*

Ann Forsyth, Director, Professor, Dayton-Hudson Chair in Urban Design (R.A.)
Ph.D., Cornell University
City and regional planning

College of Biological Sciences

Administration

Robert P. Elde, Dean

Judson D. Sheridan, Associate Dean for Research

John S. Anderson, Interim Associate Dean for Academic and Faculty Affairs

Kathleen F. Peterson, Director of Student Services

Faculty

■ *Department of Biochemistry, Molecular Biology, and Biophysics*

Adolf, Kenneth W., Associate Professor
Ph.D., University of Chicago
Gene structure and regulation, chromosome structure, non-histone proteins, virus assembly, biological assembly process

***§ Anderson, John S., Professor**
Ph.D., University of Nebraska, Lincoln
Structure and biosynthesis of bacterial cell walls and membranes

Armitage, Ian M., Professor
Ph.D., University of British Columbia
Multinuclear magnetic resonance, metal homeostasis and immunophilins

Banaszak, Len J., Professor and Dietrich Chair
Ph.D., Loyola of Chicago
Protein design, structure and function, X-ray crystallography

Barry, Bridgette A., Professor
Ph.D., University of California, Berkeley
Photosynthesis, membrane proteins, membrane transport, vibrational spectroscopy, EPR spectroscopy

§ Bernlohr, David A., Distinguished McKnight University Professor and Department Head
Ph.D., University of Illinois, Urbana
Mechanism of insulin action, regulation of gene expression by lipids

Bielinsky, Anja-Katrin, Assistant Professor
Ph.D., Heinrich Heine University, Germany
Regulation of DNA replication, cell cycle, cancer

Bloomfield, Victor A., Professor and Assistant Vice President for Research
Ph.D., University of Wisconsin, Madison
Physical biochemistry of nucleic acids, polyelectrolytes, hydrodynamics laser light scattering, scanning tunneling microscopy

Conti-Fine, Bianca M., Distinguished McKnight University Professor
M.D., University of Milano, Italy
Structure and function of nicotinic receptors in brain and muscle, immunology of myasthenia gravis

Das, Anath, Professor
Ph.D., University of Nebraska, Lincoln
Molecular mechanisms of plant-pathogen interactions and plant gene expression

Dempsey, Mary E., Professor
Ph.D., University of Minnesota
Regulation of lipid metabolism; regulation of cholesterol synthesis, lipid transport proteins, and their receptors

Flickinger, Michael C., Professor
Ph.D., University of Wisconsin, Madison
Fermentation, cell culture technology, cellular energetics, regulation of protein synthesis, protein separation

Fuchs, James A., Professor
Ph.D., Texas A&M University, College Station
Deoxynucleotide metabolism, DNA synthesis, regulation of metabolic pathways

Hendrickson, Eric A., Associate Professor
Ph.D., Harvard Medical School
Deoxynucleotide metabolism; DNA synthesis; regulation of metabolic pathways

Herrera, Julio E. Assistant Professor
Ph.D. University of Mississippi Medical Center, Jackson
Regulation of gene expression by chromatin structure and dynamics, modulation of chromatin structure by covalent modifications and non-histone chromosomal proteins

Hogenkamp, Harry P. C., Professor
Ph.D., University of California, Berkeley
Chemistry, biochemistry, and mechanisms of action of the cobamide coenzymes; synthesis and biological activity of nucleosides

*** Hooper, Alan B., Professor**
Ph.D., Johns Hopkins University
Microbial biochemistry, redox proteins, N-oxidation, microbial detoxification

Howard, James B., Professor
Ph.D., University of California, Los Angeles
Protein isolation, characterization, and sequencing methodology; metallo-enzyme structure-function relations; post translational modification of proteins; nuclear magnetic resonance of paramagnetic centers in proteins

Khodursky, Arkady B., Assistant Professor
PhD., University of California, Berkeley
Functional genomics, analysis of gene expression patterns, whole genome microarrays

Koerner, James F., Professor
Ph.D., Iowa State University
Neurobiochemistry

Lange, Alex J., Associate Professor
Ph.D., Cornell University
Therapeutic intervention in diabetes via manipulation of carbohydrate metabolism enzymes and their genes

LaPorte, David C., Professor
Ph.D., University of Illinois
Gene expression, protein phosphorylation cascades

Lipscomb, John D., Professor
Ph.D., University of Illinois
Oxygenase mechanisms, metalloproteins, magnetic resonance techniques, kinetics

Livingston, Dennis M., Professor
Ph.D., Harvard University
Mutation, DNA repair and genetic recombination

Lovrien, Rex E., Professor
Ph.D., University of Iowa
Enzymology, thermodynamics, binding processes, protein separation

Matsuo, Hiroshi, Assistant Professor
Ph.D., Osaka University, Japan
Nuclear magnetics resonance, structure of protein-RNA complexes

Mayo, Kevin H., Professor
Ph.D., University of Massachusetts
Cell adhesion, protein-protein/carbohydrate interactions

Murphy, Sharon E., Associate Professor
Ph.D., University of Colorado
Carcinogen metabolism and exposure

Nelsestuen, Gary L., Professor
Ph.D., University of Minnesota
Protein-membrane interactions; protein kinase C; complement; blood coagulation

Ohlendorf, Douglas H., Professor
Ph.D., Washington University
Protein engineering, structural biology, X-ray crystallography, molecular biology

Potter, Lincoln R., Assistant Professor
Ph.D., Vanderbilt University
Natriuretic peptide receptors, guanylyl cyclases and cGMP

Roon, Robert J., Associate Professor
Ph.D., University of Michigan
Mechanism and regulation of amino acid neurotransmission in mammalian brain, mechanism of amino acid transport in mammalian brain

Sanders, Michel M., Professor
Ph.D., University of Michigan
Eucaryotic molecular biology, hormone action, gene expression

Schmidt-Dannert, Claudia, Assistant Professor
Ph.D., University of Braunschweig, Germany
Directed evolution of emetabolic pathways, natural product biosynthesis, metabolic engineering

§ Schottel, Janet L., Professor and Associate Department Head
Ph.D., Washington University, St. Louis
Nucleic acid biochemistry, molecular biology, plant-pathogen interactions

Sheaff, Robert J., Assistant Professor
Ph.D., University of Colorado, Boulder
Cell cycle progression in mammalian cells, protein degradation, signal transduction

Siliciano, Paul G., Associate Professor
Ph.D., University of Pennsylvania
Nucleic acid biochemistry, molecular genetics

Thomas, David D., Professor
Ph.D., Stanford University
Molecular dynamics in muscle

Towle, Howard C., Professor and Associate Department Head
Ph.D., Michigan State University
Nutritional and hormonal regulation of mammalian gene expression

Tsong, Tian Y., Professor
Ph.D., Yale University
Physical biochemistry, mechanism of protein-folding, fluctuation-driven energy transduction by ion pumps

Van Ness, Brian G., Professor
Ph.D., University of Minnesota
Molecular immunology, gene expression, lymphoid cancers

Wackett, Lawrence P., Distinguished McKnight University Professor
Ph.D., University of Texas, Austin
Biodegradation, dehalogenases, industrial biotransformations, metalloenzymes

Walters, Kylie, Assistant Professor
Ph.D., Harvard University
Nuclear magnetic resonance, structure-based drug design

Wilmot, Caroline M., Assistant Professor
Ph.D., Birkbeck College, University of London
Structural enzymology, metal ions and organic co-factors

■ *Department of Ecology, Evolution, and Behavior*

Alstad, Donald N., Professor
Ph.D., University of Utah
Population ecology and evolution of insects

***§ Barnwell, Franklin H., Professor**
Ph.D., Northwestern University
Invertebrate behavior and physiology, emphasizing ecological relationships

***§ Beatty, John H., Professor**
Ph.D., Indiana University
History and philosophy of biology

Corbin, Kendall W., Professor
Ph.D., Cornell University
Evolutionary ecology and genetics, biochemical systematics

Cotner, James B., Associate Professor
Ph.D., University of Michigan
Biological limnology and oceanography, biogeochemistry, microbial ecology

Curtsinger, James W., Professor
Ph.D., Stanford University
Population/quantitative genetics—experimental and theoretical

Cushing, Edward J., Professor
Ph.D., University of Minnesota
Paleoecology and ecology of plant communities

§ Davis, Margaret B., Regents Professor Emeritus
Ph.D., Harvard University
Paleoecology, paleolimnology, forest community ecology

Dean, Anthony M., Associate Professor
Ph.D., Washington University School of Medicine
Population biology, molecular evolution

Gorham, Eville, Regents Professor Emeritus
Ph.D., University of London, England
Chemical aspects of ecology, limnology, and soil science

Hobbie, Sarah E., Assistant Professor
Ph.D., University of California, Berkeley
Ecosystem and community ecology

Jansa, Sharon A., Assistant Professor
Ph.D., University of Michigan
Mammalian systematics, biogeography, speciatim, molecular evolution

King, Jennifer Y., Assistant Professor
Ph.D., University of California, Irvine
Ecosystem ecology, biogeochemistry and earth system science

Lanyon, Scott M., Professor and Director, Bell Museum of Natural History
Ph.D., Louisiana State University
Biochemical systematics and evolution of mating systems

Larson, Diane L., Adjunct Professor
Ph.D., University of Illinois, Chicago
Ecological effects of alien plants in grassland ecosystems

Lehman, Clarence L., Adjunct Professor
Ph.D., University of Minnesota
Theoretical ecology, computational biology

May, Georgiana, Associate Professor
Ph.D., University of California, Berkeley
Evolution of fungi, interactions with plants and their mating systems

McFadden, Joseph P., Assistant Professor
Ph.D., University of California, Berkeley
Global ecology, biosphere-atmosphere interactions

McNaught, Donald, Professor Emeritus
Ph.D., University of Wisconsin
Zooplankton ecology, Great Lakes limnology, ecosystem contamination

Megard, Robert O., Professor
Ph.D., Indiana University
Limnology

Merrell, David, Professor Emeritus
Ph.D., Harvard University
Genetics

Morrow, Patrice, Professor
Ph.D., Stanford University
Plant-insect interactions and community ecology

Oberhauser, Karen S., Adjunct Professor
Ph.D., University of Minnesota
Behavioral ecology

Packer, Craig, Distinguished McKnight University Professor
Ph.D., University of Sussex, England
Behavioral ecology and sociobiology

Phillips, Richard E., Professor Emeritus
Ph.D., Cornell University
Animal behavior and physiology

Polasky, Stephen, Fesler-Lampert Professor of Ecological/ Environmental Economics (Adjunct)
Ph.D., University of Michigan
Ecological/environmental economics

Pusey, Anne E., Distinguished McKnight University Professor
Ph.D., Stanford University
Animal behavior

Regal, Philip J., Professor
Ph.D., University of California, Los Angeles
Evolution, physiological ecology and behavior, herpetology

Schmid, William D., Professor Emeritus
Ph.D., University of Minnesota
Comparative physiology and ecology

Shaw, Ruth, Professor
Ph.D., Duke University
Ecological genetics

Siniff, Donald B., Professor
Ph.D., University of Minnesota
Vertebrate ecology and population ecology of large mammals

§ Starfield, Anthony M., Professor
Ph.D., University of Witwatersrand, South Africa
Ecological modeling

Stephens, David W., Associate Professor
Ph.D., The Queen's College, Oxford University, England
Experimental games, spatially explicit models of feeding behavior

Sterner, Robert W., Professor and Department Head
Ph.D., University of Minnesota
Limnology: plankton ecology, food webs, and aquatic biogeochemistry

Sugita, Shinya, Assistant Professor
Ph.D., University of Washington
Paleoecology

Tester, John R., Professor Emeritus
Ph.D., University of Minnesota
Vertebrate ecology and ecosystem ecology

Tilman, G. David, McKnight Presidential Chair in Ecology
Ph.D., University of Michigan
Experimental and theoretical population, community ecology

Tordoff, Harrison B., Professor Emeritus
Ph.D., University of Michigan
Systematic and evolutionary biology, ornithology

Wright, Herbert E., Regents Professor Emeritus
Ph.D., Harvard University
Quaternary paleoecology and glacial geology

Zink, Robert M., Professor
Ph.D., University of California, Berkeley
Ornithology, systematics

■ *Department of Genetics, Cell Biology, and Development*

Bardwell, Vivian J., Associate Professor
Ph.D., University of Wisconsin, Madison
Transcriptional regulation in cancer and sex determination.

Bauer, G. Eric, Professor
Ph.D., University of Minnesota
Pancreatic islet physiology and islet adhesion molecules

Berman, Judith G., Professor
Ph.D., Weizmann Institute of Science
Yeast telomeres, chromatin and cell cycle; *Candida albicans* morphogenesis, cell cycle and genome organization

Berry, Susan A., Professor
M.D., Kansas University
Growth hormone responsive gene expression

Blumenfeld, Martin, Associate Professor
Ph.D., Case Western Reserve University
Genomics

Brooker, Robert J., Professor
Ph.D., Yale University
Molecular biology of the lactose permease

Chen, Lihsia, Assistant Professor
Ph.D., Johns Hopkins University
Cell adhesion, signal transduction, cytoskeleton, *C. elegans*

Clarke, Duncan, Assistant Professor
Ph.D., University of Cambridge
Cell cycle checkpoint controls

Conklin, Kathleen F., Associate Professor
Ph.D., Tufts University
Virally- and non-virally-induced tumors

Coucouvanis, Electra, Assistant Professor
Ph.D., Stanford University
Cell death, differentiation, cell lineage specification

Cunningham, William P., Professor Emeritus
Ph.D., University of Texas, Austin
Conservation biology, land-use issues, environmental ethics

Ekker, Stephen C., Associate Professor
Ph.D., Johns Hopkins University
Embryonic patterning, zebrafish, Xenopus, transposons, gene discovery

Erlandsen, Stanley L., Professor
Ph.D., University of Minnesota
Electron microscopy, high resolution imaging of cell surfaces

Fan, David P., Professor
Ph.D., Massachusetts Institute of Technology
Computer management of information, impact of information on society

Faras, Anthony J., Professor
Ph.D., University of Colorado Medical School
Replication of tumor viruses

Goldstein, Stuart F., Professor
Ph.D., California Institute of Technology
Cell motility, especially flagellar beating

Hackett, Perry B., Professor
Ph.D., University of Colorado Medical Center
Gene expression in zebrafish, transposon, human gene therapy

Hamilton, David W., Professor
Ph.D., Cambridge University
The sperm plasma membrane

Hays, Thomas S., Associate Professor
Ph.D., University of North Carolina
Cytoskeletal-based motility, functions of cytoplasmic dynein

Herman, Robert K., Professor
Ph.D., Yale University
Developmental genetics of *C. elegans*

Herman, William S., Professor
Ph.D., Northwestern University
Arthropod peptide hormones

Hirsch, Betsy A., Associate Professor
Ph.D., University of Minnesota
Chromosome abnormalities

Iwanij, Victoria, Associate Professor
Ph.D., Rockefeller University
Characterization of the glucagon receptor

Johnson, Ross G., Professor
Ph.D., Iowa State University
Cell communication mediated by gap junctions, assembly mechanisms and role in embryos

King, Richard A., Professor
Ph.D., University of Minnesota; M.D., Jefferson Medical
Genetic regulation of melanin pigmentation

Kirkpatrick, David T., Assistant Professor
Ph.D., Massachusetts Institute of Technology
Recombination initiation and DNA repair during meiosis

Kuriyama, Ryoko, Professor
Ph.D., University of Tokyo
Cell division and cell-cycle control in animal cells.

Largaespada, David A., Assistant Professor
Ph.D., University of Wisconsin, Madison
Identification and understanding of genes involved in myeloid leukemia development

Lefebvre, Paul A., Professor
Ph.D., Yale University
Flagellar protein assembly in *Chlamydomonas*

LeRoy, Bonnie S., Program Director
M.S., Sarah Lawrence College
Education and clinical preparation of genetic counseling professionals

Linck, Richard W., Professor
Ph.D., Brandeis University
Molecular assembly and function of the microtubule cytoskeleton

Magee, P. T., Professor
Ph.D., University of California, Berkeley
Analysis of the genome of *Candida albicans*

McIvor, R. Scott, Professor
Ph.D., University of Minnesota
Genes introduced into the hematopoietic cells *in vivo*

Miller, Jeffrey R., Assistant Professor
Ph.D., Drake University
Wnt signal transduction, cell-cell signaling, vertebrate development, cell fate determination, morphogensis, cancer biology

Neufeld, Thomas P., Assistant Professor
Ph.D., University of California, Berkeley
Developmental control of growth and cell proliferation in *Drosophila*

O'Connor, Michael B., Professor and Howard Hughes Associate Investigator
Ph.D., Tufts University
Cell-cell interactions in growth, differentiation, and development

Orr, Harry T., Professor
Ph.D., Washington University
Molecular genetics of brain development and neurodegeneration

Porter, Mary E., Associate Professor
Ph.D., University of Pennsylvania
Regulation of dynein-based motility

Ranum, Laura P. W., Associate Professor
Ph.D., University of Minnesota
Molecular genetics of neurodegenerative diseases

Ross, M. Elizabeth, Associate Professor
M.D., Ph.D., Cornell University Medical College
Mammalian brain development, neurogenetics, gene expression

Rougvie, Ann E., Associate Professor
Ph.D., Cornell University
Developmental timing in *C. elegans*

Shaw, Jocelyn E., Associate Professor
Ph.D., University of Toronto
C. elegans embryonic development

Shawlot, William, Assistant Professor
Ph.D., Baylor College of Medicine
Genetic control of pattern formation during mouse embryogenesis

Silflow, Carolyn D., Professor
Ph.D., University of Georgia
Microtubule component of the cytoskeleton

*** Simmons, Michael J., Professor**
Ph.D., University of Wisconsin, Madison
Transposable genetic elements in *Drosophila*

Simon, Jeffrey A., Associate Professor
Ph.D., Cornell University
Animal development, control of gene expression, chromatin mechanisms

Sinha, Akhouri A., Adjunct Professor
Ph.D., University of Missouri, Columbia
Stromal-epithelial interaction in tumors

Somia, Nikunj V., Assistant Professor
PhD., University of Edinburgh
Retrovirus biology, gene therapy and gene discovery

Sorenson, Robert L., Professor
Ph.D., University of Minnesota
Cell biology of insulin secretion and cell division in islets of Langerhans

Titus, Margaret A., Associate Professor
Ph.D., Brandeis University
Molecular genetic analysis of unconventional myosin function

Van Ness, Brian G., Professor and Department Head
Ph.D., University of Minnesota
Molecular immunology

Zarkower, David A., Associate Professor
Ph.D., University of Wisconsin, Madison
Molecular genetics of sex determination and gene regulation

■ *Department of Plant Biology*

*** Biesboer, David D., Professor**
Ph.D., Indiana University
Ecophysiology and anatomy of angiosperms

Brambl, Robert M., Professor
Ph.D., University of Nebraska
Function of chaperone proteins and regulation of gene expression

***§ Charvat, Iris D., Professor**
Ph.D., University of California, Santa Barbara
Mycorrhizal associations, fungal development, seed bank dynamics in wetlands

Frenkel, Albert W., Professor Emeritus
Ph.D., University of California, Berkeley
Photosynthesis and photophosphorylation in green plants and photosynthetic bacteria

Gantt, J. Stephen, Associate Professor
Ph.D, University of California, Irvine
Gene expression in plants

Gleason, Florence K., Professor
Ph.D., University of Iowa
Physiological function of thioredoxin in cyanobacteria

Gray, William, Assistant Professor
Ph.D.. University of Iowa
Molecular basis of auxin-regulated growth and development, ubiquitin-mediated proteolysis

*** Koukkari, Willard L., Professor**
Ph.D., University of New Hampshire
Biological oscillations and temporal organization of plant development

Marks, M. David, Associate Professor
Ph.D., Purdue University
Control of cell fate and differentiation in plants

McLaughlin, David J., Professor
Ph.D., University of California, Berkeley
Evolution and systematics of fungi, especially basidiomycetes

Ni, Min, Assistant Professor
Ph.D., University of Oklahoma, Norman
Light signal transduction and photomorphogenesis

Olszewski, Neil E., Professor
Ph.D., University of Minnesota
Molecular mechanisms of hormone action, molecular genetics of DNA viruses

***§ Snustad, Peter, Professor**
Ph.D., University of California, Davis
Cytoskeleton and cell motility, gene expression, developmental mechanisms

Tiffin, Peter, Assistant Professor
Ph.D., Duke University
Evolutionary and ecological genetics, molecular and phenotypic evolution of plant defenses

VandenBosch, Kathryn, Professor and Department Head
Ph.D., University of Massachusetts
Cell biology of plant/microbe symbioses, functional genomics of legumes

Ward, John, Assistant Professor
Ph.D., University of Maryland
Membrane proteins and transport physiology

Weiblen, George, Assistant Professor
Ph.D., Harvard University
Plant systematics, molecular phylogenetics, coevolution and plant/pollinator interactions

Weinig, Cynthia
Ph.D., Indiana University
Evolution of developmental plasticity in plants

Wetmore, Clifford M., Professor
Ph.D., Michigan State University
Lichen floristics and air pollution studies

§ Wick, Susan M., Professor
Ph.D., Stanford University
Plant molecular biology and developmental biology

■ *Biotechnology Institute*

Brooker, Robert J., Professor
Ph.D., Yale University
Molecular biology of the lactose permease

Dean, Antony M., Associate Professor
Ph.D., Washington University School of Medicine
Population biology

Flickinger, Michael C., Professor
Ph.D., University of Wisconsin, Madison
Biocatalysis, starvation-induced gene expression, immunoglobulin synthesis, ceramic bioseparation

Khodursky, Arkady B., Assistant Professor
Ph.D., University of California, Berkeley
Microbial genomics

Sadowsky, Michael J., Professor
Ph.D., University of Hawaii
Identification and regulation of genes involved in early periods of plant microbe symbioses

Sherman, David H., Professor
Ph.D., Columbia University
Antibiotic biosynthesis in *Streptomyces*

Srienc, Friedrich, Professor
Ph.D., Technical University in Graz, Austria
Fermentation and biochemical engineering

Urry, Dan, Professor
Ph.D., University of Utah
Elastic model proteins and energy conversions

Valentas, Kenneth J., Director
Ph.D., University of Minnesota
Whole crop biorefining

Wackett, Lawrence P., Professor
Ph.D., University of Texas, Austin
Biodegradation, metalloenzymes, biotechnology

■ *Plant Molecular Genetics Institute*

Barry, Bridgette A., Professor
Ph.D., University of California, Berkeley
Photosynthesis, membrane proteins, membrane transport, vibrational spectroscopy, EPR spectroscopy

Berman, Judith G., Professor
Ph.D., Weizmann Institute of Science
Yeast telomeres; chromatin and cell cycle; *Candida albicans* morphogenesis, cell cycle, and genome organization

Brambl, Robert M., Professor
Ph.D., University of Nebraska
Function of chaperone proteins and regulation of gene expression

Cohen, Jerry D., Professor and Bailey Chair
Ph.D., Michigan State University
Plant biochemistry, cellular and molecular biology

Das, Anath, Professor
Ph.D., University of Nebraska, Lincoln
Molecular mechanisms of plant-pathogen interactions and plant gene expression

Gantt, J. Stephen, Associate Professor
Ph.D., University of California, Irvine
Gene expression in plants

Gengenbach, Burle G., Professor
Ph.D., University of Illinois
Molecular genetics of developmental and biochemical processes

Lefebvre, Paul A., Professor
Ph.D., Yale University
Flagellar protein assembly in *Chlamydomonas*

Marks, M. David, Associate Professor
Ph.D., Purdue University
Control of cell fate and differentiation in plants

May, Georgiana, Associate Professor
Ph.D., University of California, Berkeley
Evolution of fungi, interactions with plants and their mating systems

Muehlbauer, Gary, Assistant Professor
Ph.D., University of Minnesota
Molecular genetics of fusarium head blight in wheat and barley

Ni, Min, Assistant Professor
Ph.D., University of Oklahoma, Norman
Light signal transduction and photomorphogenesis

Olszewski, Neil E., Professor
Ph.D., University of Minnesota
Molecular mechanisms of hormone action, molecular genetics of DNA viruses

Phillips, Ronald L., Regents Professor
Ph.D., University of Minnesota
Plant molecular genetics

Sadowsky, Michael, Professor
Ph.D., University of Hawaii
Bacterial genes involved in early periods of legume-microbe interactions and biodegradation

Samac, Deborah A., Associate Professor
Ph.D., University of Wisconsin, Madison
Molecular biology of host-parasite interactions

§ Schottel, Janet L., Professor
Ph.D., Washington University, St. Louis
Nucleic acid biochemistry, molecular biology

Silflow, Carolyn D., Professor
Ph.D., University of Georgia
Microtubule component of the cytoskeleton

Smith, Alan G., Associate Professor
Ph.D., University of Florida
Physiology and molecular genetics of plant development

***§ Snustad, D. Peter, Professor**
Ph.D., University of California, Davis
Cytoskeleton and cell motility, gene expression, developmental mechanisms

Somers, David A., Professor
Ph.D., Washington State University
Molecular genetics applied to crop improvement

Szabo, Les, Adjunct Associate Professor
Ph.D., Oregon State University
Molecular genetics in host-parasite interactions of rust diseases on small cereal grains

Vance, Carroll P., Professor
Ph.D., Ohio State University
Biochemistry and molecular biology of N_2 fixation and N assimilation: plant molecular adaptations to phosphorous stress and functional genomics of Medicago

VandenBosch, Kathryn, Professor and Department Head
Ph.D., University of Massachusetts
Cell biology of plant/microbe symbioses, functional genomics of legumes

Ward, John, Assistant Professor
Ph.D., University of Maryland
Membrane proteins and transport physiology

Wick, Susan M., Professor and Director
Ph.D., Stanford University
Plant molecular biology and developmental biology

Young, Nevin D., Professor
Ph.D., Yale University
Genetics of plant-microbe interactions and plant genomics

General Biology Program and Instructional Laboratories

John S. Anderson, Director of General Biology

Mark Decker, Assistant Education Specialist

Bruce Fall, Associate Education Specialist

Richard Peifer, Education Specialist

Jane Phillips, Coordinator of CBS Instructional Labs

Contributing Faculty From Other University Units

■ *Department of Microbiology—Medical School*

Anderson, Dwight L., Professor
Ph.D., University of Minnesota
Bacillus subtilis bacteriophage Ø29 morphogenesis

Armstrong, Sandra, Assistant Professor
Ph.D., University of Missouri, Columbia
Iron acquisition and gene regulation in *Bordetella pertussis*

Judith Berman, Professor
Ph.D., Weizmann Institute of Science
Morphogenesis in *Candida albicans*; Telomere function, aging and chromatin assembly in *Saccharomyces cerevesiae*

Bey, Russell, Associate Professor
Ph.D., University of Minnesota
Pathogenic mechanisms and immunology

Bohjanen, Paul, Assistant Professor
M.D., Ph.D., University of Michigan
T lymphocyte RNA stability

Cleary, P. Patrick, Professor
Ph.D., University of Rochester, New York
Molecular genetics of streptococcal cell-surface antigens

Davis, Dana A., Assistant Professor
Ph.D., University of Arizona
Candida albicans genetics and pathogenesis

Dunny, Gary, Professor
Ph.D., University of Michigan
Molecular biology of conjugative gene transfer in gram-positive bacteria

Dworkin, Martin, Professor
Ph.D., University of Texas, Austin
Contact-mediated cell-cell interactions and developmental biology of *Myxococcus xanthus*

Germaine, Gregory, Professor
Ph.D., University of Minnesota
Human oral bacteria

Haase, Ashley T., Regents Professor and Department Head
M.D., Columbia College of Physicians and Surgeons
HIV pathogenesis

Hanson, Richard S., Professor
Ph.D., University of Illinois, Urbana
Ecology, biochemistry, and genetics of methylotrophic bacteria

Jemmerson, Ronald, Associate Professor
Ph.D., Northwestern University
b-cell and antibody recognition of protein antigens

Jenkins, Marc K., Professor
Ph.D., Northwestern University
Activation requirements of helper T lymphocytes

Johnson, Russell C., Professor
Ph.D., University of Wisconsin, Madison
Lyme disease host-parasite interactions

Kapur, Vivek, Associate Professor
Ph.D., Pennsylvania State University
Molecular mechanisms of bacterial pathogenicity and evolution

Magee, Paul T., Professor
Ph.D., University of California, Berkeley
Genetics and molecular biology of *Candida albicans*

McKay, Larry L., Professor
Ph.D., Oregon State University
Plasmid biology, genetics, and applications of lactic acid bacteria

Mohr, Christian, Assistant Professor
Ph.D., University of Texas, San Antonio
Flagellar export and assembly in *C. crescentus* and *B. cepacia*

Plagemann, Peter G. W., Professor
Ph.D., Case Western Reserve University
Mechanisms of viral infections, and modulation by host immune responses

§ Rogers, Palmer, Professor Emeritus
Ph.D., Johns Hopkins University
Mechanisms of regulation of fermentation pathways, and development of *Clostridrium*

Sadowsky, Michael, Professor
Ph.D., University of Hawaii
Soil microbiology, biodegradation, *Rhizobium* and *Bradyrhizobium*-host interactions

*** Schiff, Leslie A., Associate Professor**
Ph.D., Tufts University
Virus-host cell interactions and viral protein structure-function

Schlievert, Patrick M., Professor
Ph.D., University of Iowa
Immunobiology, and genetic control of staphyloccoccal and streptococcal pyrogenic toxins

Sherman, David H., Professor
Ph.D., Columbia University
Antibiotic biosynthesis in *Streptomyces*

Southern, Peter J., Associate Professor
Ph.D., Edinburgh University
Molecular basis of persistent virus infection and virus-induced disease

Watson, Dennis W., Regents Professor Emeritus
Ph.D., University of Wisconsin, Madison
Immunology

■ *Department of Neuroscience—Medical School*

Amirikian, Bagrat, Assistant Professor
Ph.D., Moscow State University
Neural networks and motion

Ashe, James, Associate Professor
M.D., University College Dublin, Ireland
Neural control of movement

Boland, Linda M., Assistant Professor
Ph.D., University of North Carolina, Chapel Hill
Molecular physiology of ion channels

Branton, Dale, Associate Professor
Ph.D., University of California, San Francisco
Cellular and molecular aspects of physiological regulatory mechanisms

Dubinsky, Janet, Associate Professor
Ph.D., University of North Carolina, Chapel Hill
Neurodegeneration as a result of glutamate toxicity

Ebner, Timothy J., Professor and Department Head
M.D., Ph.D., University of Minnesota
Neurophysiology of cerebellum and motor cortex

Elde, Robert P., Professor
Ph.D., University of Minnesota
Central and peripheral nervous systems

Engeland, William, Professor
Ph.D., University of California, San Francisco
Neuroendocrinology of stress

Flanders, Martha, Professor
Ph.D., Michigan State University
Neural control of movement

Georgopoulos, Apostolos P., Professor
M.D., Ph.D., University of Athens School of Medicine
Neurophysiology of motor function and cognition

Giesler, Glenn J., Jr., Professor
Ph.D., University of California, Los Angeles
Somatic sensory processing, pain

Honda, Christopher N., Associate Professor
Ph.D., University of North Carolina, Chapel Hill
Anatomical and physiological bases of somesthesis, with emphasis on mechanisms of pain

Kofuji, Paulo, Assistant Professor
Ph.D., University of Maryland
Ion channels

Letourneau, Paul C., Professor
Ph.D., Stanford University
Developmental neurobiology

Leuthold, Arthur, Assistant Professor
Ph.D., University of Wisconsin, Madison
Magnetocardiography

Liao, Dezhi, Assistant Professor
Ph.D., University of Iowa
Molecular and cellular mechanisms of synaptic plasticity

McLoon, Steven C., Professor
Ph.D., University of Illinois, Chicago
Development and regeneration of axonal connections

Mermelstein, Paul, Assistant Professor
Ph.D., University of Michigan
Calcium signaling and cellular excitability

Miller, Robert F., Professor
M.D., University of Utah
Synaptic transmission in the retina and relationships of single, identified neurons and glial cells

Newman, Eric A., Professor
Ph.D., Massachusetts Institute of Technology
Physiology and functions of glial cells

Pellizzer, Giuseppe, Assistant Professor
Ph.D., University of Geneva, Switzerland
Neural control of cognitivo-motor behavior

Poppele, Richard E., Professor
Ph.D., University of Minnesota
Neurophysiology and motor control

Redish, A. David, Assistant Professor
Ph.D., Carnegie Mellon University
Spatial reasoning and navigation—from neurons to behavior

Seybold, Virginia S., Professor
Ph.D., University of Minnesota
Neuroanatomy, neuropharmacology, pain, autonomic nervous system, neuroendocrines

Soechting, John F., Professor
Ph.D., Cornell University
Motor control neurophysiology

Wessendorf, Martin W., Associate Professor
Ph.D., University of Illinois, Chicago
Brainstem control of spinal function, methods in fluorescence microscopy

Wilcox, George L., Professor
Ph.D., University of Colorado, Boulder
Psychotherapeutic toxicity, pain transmission, drugs of abuse

School of Dentistry and Division of Dental Hygiene

Administration

Peter J. Polverini, D.D.S., D.M.Sc., Dean, School of Dentistry

Kathleen J. Newell, R.D.H., Ph.D., Director, Division of Dental Hygiene

Faculty

§ Dittmar, Susan, R.D.H., Clinical Dental Specialist
B.S., University of Iowa, Iowa City
Preclinical/clinical dental hygiene, biomaterials, local anesthesia

Blue, Christine M., R.D.H., Clinical Dental Specialist
M.S., Old Dominion University
Head and neck anatomy, special needs patients, clinic, pre-clinic

Jacobsen, Steven, D.D.S., Associate Clinical Dental Specialist
D.D.S. University of Minnesota
Clinical dental hygiene, local anesthesia

Newell, Kathleen J., R.D.H., Associate Professor
Ph.D., University of Minnesota
Writing in the curriculum, ethics, diversity, domestic violence

§ Osborn, Joy B., R.D.H., Associate Professor
M.A., University of Minnesota
Periodontology, preclinic and advanced instrumentation, ergonomics

Stoltenberg, Jill L., R.D.H., Associate Professor
M.A., University of Minnesota
Periodontal diseases, dental caries, fluoride, clinical dental hygiene

Young, Lynda J., R.D.H., Associate Professor and Director, Continuing Dental Education
M.A., University of Minnesota
Continuing dental education

College of Education and Human Development

Administration

Steven R. Yussen, Dean

Robert C. Serfass, Associate Dean for Academic Affairs

James Ysseldyke, Associate Dean for Research

Mary L. Bents, Assistant Dean, Director of Student & Professional Services

Deborah Dillon, Chair, Department of Curriculum and Instruction

James C. Hearn, Chair, Department of Educational Policy and Administration

Mary A. McEvoy, Chair, Department of Educational Psychology

Ann S. Masten, Director, Institute of Child Development

Michael G. Wade, Director, School of Kinesiology

Jane E. Plihal, Chair, Department of Work, Community, and Family Education

Faculty

■ *Curriculum and Instruction*

Avery, Patricia, Professor
Ph.D., Emory University
Social studies education, history of American education, political education

§ Beach, Richard W., Professor
Ph.D., University of Illinois
English education

Bigelow, Martha, Assistant Professor
Ph.D., Georgetown University
Second languages and cultures

Buggey, JoAnne, Lecturer
Ph.D., University of Washington
Elementary education, social studies education

Carrier, Carol A., Professor
Ph.D., Syracuse University
Instructional design variables, including learner characteristics

Ceglowski, Deborah, Assistant Professor
Ph.D., University of Illinois, Urbana-Champaign
Early childhood education

§ Cogan, John, Professor
Ph.D., Ohio State University
Elementary education, social studies education

Cramer, Kathleen, Associate Professor
Ph.D., University of Minnesota
Mathematics education

DiBlasio, Margaret, Associate Professor
Ph.D., Ohio State University
Art education

Dillon, Deborah, Professor
Ph.D., University of Georgia
Literary research and methods

Finley, Fred, Associate Professor
Ph.D., Michigan State University
Science education, environmental education

Galda, Lee, Professor
Ph.D., New York University
Children's literature, response to literature

Graves, Michael F., Professor
Ph.D., Stanford University
Reading and English education

Hartoonian, H. Michael, Lecturer
Ph.D., University of Wisconsin
Social studies education

Heller, Patricia A., Associate Professor
Ph.D., University of Michigan
Elementary and science education

Hooper, Simon R., Associate Professor
Ph.D., Pennsylvania State University
Instructional systems and technology

Huffman, Douglas, Assistant Professor
Ph.D., University of Minnesota
Science education

Hughes, Joan, Assistant Professor
Ph.D., Michigan State University
Cognition and technology with specialty areas in technology, teacher learning, and professional development

Johnson, Roger T., Professor
Ed.D., University of California, Berkeley
Elementary and science education, cooperative learning

Kahan, Jeremy, Assistant Professor
Ph.D., University of Maryland
Mathematics education

Kalnin, Julie, Assistant Professor
Ph.D., University of California, Berkeley
Literacy studies and English education

Lambrecht, Judith, Professor
Ph.D., University of Wisconsin
Computer technology, accounting methods, office and economic education

Lawrenz, Frances, Professor
Ph.D., University of Minnesota
Science education, evaluation

Lensmire, Timothy, Associate Professor
Ph.D., Michigan State University
Literacy education, elementary school writing instruction

Manning, John, Professor
Ed.D., Boston University
Elementary education, literacy education

O'Brien, David, Professor
Ph.D., University of Georgia
Literacy education, use of information technologies

Post, Thomas R., Professor
Ph.D., Indiana University
Elementary education, mathematics education

Taylor, Barbara M., Professor
Ed.D., Virginia Polytechnic Institute and State University
Literacy education, reading difficulties

Tedick, Diane J., Associate Professor
Ph.D., Ohio State University
Second languages and cultures education

Walker, Constance L., Associate Professor
Ph.D., University of Illinois, Urbana-Champaign
Second languages and cultures, serving bilingual populations

§ Watts-Taffe, Susan, Associate Professor
Ed.D., State University of New York, Buffalo
Elementary education, literacy education

■ *Educational Policy and Administration*

Alexander, Nicola A., Assistant Professor,
Ph.D., State University of New York, Albany
Public finance, policy studies, public sector economics, budgeting and cost-benefit analysis

Ammentorp, William M., Professor
Ph.D., University of Chicago
Organizational systems and theory, higher education administration and finance

§ Anderson, Melissa S., Associate Professor
Ph.D., University of Minnesota
Higher education administration and policy, graduate education, ethics and misconduct in science, faculty issues

Brunner, C. Cryss, Associate Professor
Ph.D., University of Kansas
Educational management and leadership

§ Chapman, David C., Professor
Ph.D., Syracuse University
Educational development, program evaluation, education policy

§ Cogan, John J., Professor
Ph.D., Ohio State University
Comparative and international development education, social studies and global environment education, citizenship education

Fry, Gerald W., Professor
Ph.D., Stanford University
Development education with areas of concentration in Southeast Asia, research methodology, and development studies

§ Harkins, Arthur M., Associate Professor
Ph.D., University of Kansas
Educational and workplace futures, knowledge-based learning, advanced technologies for learning personalization, future cultural and educational systems

Hearn, James C., Professor
Ph.D., Stanford University
Postsecondary education policy, policy analysis, educational organization

Hendel, Darwin D., Associate Professor
Ph.D., University of Minnesota
Undergraduate education, evaluation of teaching and learning, strategic planning

Johnson, David R., Associate Professor
Ph.D., University of Minnesota
Special education administration, evaluation studies, disability policy analysis, community integration

§ King, Jean A., Associate Professor
Ph.D., Cornell University
School change, program evaluation, action research, professional development schools

Lewis, Darrell R., Professor
Ph.D., Louisiana State University
Economics of education, economic evaluation, cost effectiveness, faculty development

McLeod, Scott, Assistant Professor
Ph.D., University of Iowa
Educational management and leadership

§ Paige, R. Michael, Associate Professor
Ph.D., Stanford University
International development education, intercultural education and training, multicultural education

Schneider, Byron J., Associate Professor
Ph.D., University of Chicago
Youth development leadership, youth policy, education in the community

Seashore, Karen, Professor
Ph.D., Columbia University
Organizational theory, planned change, schools as workplaces, leadership and administration

Yeh, Stuart, Assistant Professor
Ph.D., Stanford University
Education program evaluation

§ York-Barr, Jennifer, Associate Professor
Ph.D., University of Wisconsin
Teacher leadership, interprofessional collaboration, professional development, developmental disabilities

■ *Educational Psychology*

Erickson, V. Lois, Associate Professor
Ph.D., University of Minnesota
Human development, cognitive development, depth psychology

Counseling and Student Personnel Psychology

Goh, Michael, Assistant Professor
Ph.D., University of Minnesota
Career development

Hummel, Thomas J., Professor
Ph.D., Ohio University
Computer applications, experimental design as applied to counseling research

Romano, John L., Professor
Ph.D., Arizona State University
Stress, coping, and wellness; college student development; international education

*** Skovholt, Thomas M., Professor**
Ph.D., University of Missouri
Professional psychology, counselor training, sex roles

Turner, Sherri, Assistant Professor
Ph.D., University of Missouri, Columbia
Counseling and student personnel psychology

§ Veach, Patricia McCarthy, Professor
Ph.D., Ohio State University
Counseling process and self-disclosure research, practica, supervision, and counseling

Wahl, Kay Herting, Assistant Professor
Ed.D., University of South Dakota
Counseling, educational psychology

Psychological Foundations

§ Bart, William M., Professor
Ph.D., University of Chicago
Cognitive process in reasoning, cognitive diagnostic testing and associated psychometric models, educational reform and improvement

Davenport, Ernest C., Associate Professor
Ph.D., University of North Carolina at Chapel Hill
Computers in social science research, exploratory data analysis

Davison, Mark L., Professor
Ph.D., University of Illinois, Urbana-Champaign
Educational and psychological measurement, psychological scaling, statistics

*** § Garfield, Joan, Associate Professor**
Ph.D., University of Minnesota
Applied statistics, survey design, evaluation methods

Harwell, Michael, Professor
Ph.D., University of Wisconsin, Madison
Behavior of parametric and nonparametric statistical tests under assumption violations, applications of meta-analysis in methodological research

Johnson, David W., Professor
Ed.D., Columbia University
Cooperation and competition, conflict resolution, social psychology of groups

Lawrenz, Frances P., Professor
Ph.D., University of Minnesota
Science education, program and evaluation studies

Long, Jeffrey, Assistant Professor
Ph.D., University of Southern California
Quantitative psychology

Maruyama, Geoffrey M., Professor
Ph.D., University of Southern California
Diversity in education, educational applications of social psychology

Pellegrini, Anthony, Professor
Ph.D., Ohio State University
Children's play, observational research methods

Rodriguez, Michael C., Assistant Professor
Ph.D., Michigan State University
Measurement and quantitative methods

§ Samuels, S. Jay, Professor
Ed.D., University of California
Learning and cognition, psychology of values, character education

Tennyson, Robert D., Professor
Ph.D., Brigham Young University
Adult learning, instructional psychology and technology, educational technology

§ van den Broek, Paulus, Professor
Doctoraals, University of Leiden, The Netherlands, Ph.D., University of Chicago
Performance of complex cognitive tasks (learning, reading, remembering, reasoning)

School Psychology

Christenson, Sandra L., Professor
Ph.D., University of Minnesota
Home-school-community collaboration, ecological assessment

Ginsburg-Block, Marika, Assistant Professor
Ph.D., University of Pennsylvania
School-based intervention for low-achieving urban youth

McConnell, Scott R., Professor
Ph.D., University of Oregon
Early childhood, prenatal exposure to drugs and alcohol

§ Ysseldyke, James E., Professor
Ph.D., University of Illinois
Educational outcomes, assessment, education of students with mild disabilities

Special Education

Bruininks, Robert H., Professor
Ph.D., Vanderbilt University
Developmental disabilities

Deno, Stanley L., Professor
Ph.D., University of Minnesota
Mild disabilities

Espin, Christine A., Associate Professor
Ph.D., University of Minnesota
Learning disabilities

Hupp, Susan C., Professor
Ph.D., University of Illinois
Developmental disabilities

McComas, Jennifer, Assistant Professor
Ph.D., University of Iowa
Emotional and behavioral disorders

McEvoy, Mary A., Professor
Ph.D., University of Tennessee
Early childhood/special education

Rose, Susan, Associate Professor
Ph.D., Ohio State University
Deaf/hard-of-hearing

Symons, Frank, Assistant Professor, McKnight Land-Grant Professor
Ph.D., Vanderbilt University
Education and human development, special education

Cooperating Faculty

Abery, Brian H., Lecturer
Ph.D., University of Minnesota
School-age services, community integration

Egeland, Byron, Professor
Ph.D., University of Iowa
Child development, psychological assessments

§ Puncochár, Judith M., Lecturer
Ph.D., University of Minnesota
Human relations, interpersonal and personality effects on learning

Reichle, Joe, Professor
Ph.D., University of Wisconsin
Communicative disorders

§ Weinberg, Richard A., Professor
Ph.D., University of Minnesota
Child development

■ *Institute of Child Development*

***§ Bauer, Patricia J., Professor**
Ph.D., Miami University, Ohio
Cognitive and conceptual development, memory

***§ Collins, W. Andrew, Professor**
Ph.D., Stanford University
Socialization, social cognition, family relations

Crick, Nicki R., Professor
Ph.D., Vanderbilt University
Social-cognitive aspects of development

Egeland, Byron, Professor
Ph.D., State University of Iowa
Developmental psychopathology, abuse and maltreatment

Georgieff, Michael, Professor
M.D., Washington University
Neonatology

Gunnar, Megan R., Distinguished McKnight University Professor
Ph.D., Stanford University
Social and biological aspects of development

§ Karatekin, Canan, Assistant Professor, McKnight Land-Grant Professor
Ph.D., University of California, Los Angeles
Cognitive neuroscience, child clinical psychology

Maratsos, Michael P., Professor
Ph.D., Harvard University
Language development, psycholinguistics

***§ Masten, Ann S., Professor**
Ph.D., University of Minnesota
Developmental psychopathology, stress and coping, humor

Nelson, Charles A., Distinguished McKnight University Professor
Ph.D., University of Kansas
Perceptual and cognitive development, cognitive neuroscience

Pick, Anne D., Professor
Ph.D., Cornell University
Perceptual development, cognitive processes

Pick, Herbert L., Jr., Professor
Ph.D., Cornell University
Perceptual development, learning

Sera, Maria D., Associate Professor
Ph.D., Indiana University
Cognitive and linguistic development

Sroufe, L. Alan, Professor
Ph.D., University of Wisconsin
Socioemotional development, developmental psychopathology

§ Weinberg, Richard A., Professor
Ph.D., University of Minnesota
Behavior genetics, assessment, preschool education

Yonas, Albert, Professor
Ph.D., Cornell University
Perceptual development

Yussen, Steven R., Professor
Ph.D., University of Minnesota
Children's learning and cognitive development

Adjunct Faculty

Borchardt, Carrie M., Professor
M.D., University of Nebraska College of Medicine
Child and adolescent depression

Blyth, Dale, Professor
Ph.D., University of Minnesota
Youth development

Christenson, Sandra, Associate Professor
Ph.D., University of Minnesota
Family-school partnerships, family learning environments

Grotevant, Harold D., Professor
Ph.D., University of Minnesota
Adolescent development, family relationships, adoptive families, family assessment

Hupp, Susan C., Professor
Ph.D., University of Illinois
Social behavior, personality development

Leon, Gloria, Professor
Ph.D., University of Maryland
Eating disorders, stress and coping health psychology

Luciana, Monica, Assistant Professor
Ph.D., University of Minnesota
Neuropsychology, cognitive psychology

McConnell, Scott, Professor
Ph.D., University of Oregon
Early childhood development

Oberg, Charles, Associate Professor
M.D., University of Minnesota
Child and family policy

Shapiro, Elsa G., Associate Professor
Ph.D., University of Minnesota
Neurology

Tellegen, Auke, Professor
Ph.D., University of Minnesota
Personality assessment, personality theory, hypnosis, behavior genetics

Thomas, Ruth G., Professor
Ph.D., University of Minnesota
Teaching and learning cognitive theory, parent-child relations

§ van den Broek, Paulus, Professor
Doctoraals, University of Leiden, The Netherlands; Ph.D., University of Chicago
Learning, cognition

Warren, Susan L., Assistant Professor
M.D., Brown University
Emotional development of young children

Williams, Carolyn L., Associate Professor
Ph.D., University of Georgia
Health care psychology

■ *Kinesiology, School of*

Kinesiology

Dengel, Donald, Assistant Professor
Ph.D., University of Georgia
Exercise science, geriatrics

Kane, Mary Jo, Professor
Ph.D., University of Illinois
Social-psychological parameters of sport/physical activity, women in sport

Konczak, Jürgen, Assistant Professor
Ph.D., University of Wisconsin
Neuromotor control, biomechanics of coordination, pathokinesiology, developmental kinesiology

Krotee, March L., Associate Professor
Ph.D., University of Pittsburgh
Psychology, sociology, sport management, international and comparative dimensions of sport

Leon, Arthur S., Professor
M.D., University of Wisconsin
Exercise physiology, physical activity's role in chronic disease

Pickert, Robert R., Assistant Professor
M.A., University of South Dakota
Physical activity programming, management, coaching, sport facilities, undergraduate advising

Serfass, Robert C., Associate Professor
Ph.D., University of Minnesota
Exercise physiology, sport training, fitness, sport nutrition

Spletzer, Elizabeth, Education Specialist
M.S., Eastern Michigan University
Pedagogy, biomechanics

Stoffregen, Thomas, Associate Professor
Ph.D., Cornell University
Human factors

Wade, Michael G., Professor
Ph.D., University of Illinois
Motor skill development, human factors, developmental disabilities, aging

Wiese-Bjornstal, Diane M., Associate Professor
Ph.D., University of Oregon
Sport psychology, youth sport, psychology of sport injury

Recreation, Park, and Leisure Studies

Anderson, Bruce, Associate Professor
Ph.D., University of Minnesota
Sport management, sports facilities, recreational sports

Buysse, JoAnn, Education Specialist
Ph.D., University of Minnesota
Gender issues in sport, social psychology of sport, ethics, media

Kane, Mary Jo, Professor
Ph.D., University of Illinois
Social-psychological parameters of sport/physical activity, women in sport

§ McAvoy, Leo, Professor
Ph.D., University of Minnesota
Outdoor recreation programs and resources, park planning and management

Outley, Corliss, Assistant Professor
Ph.D., Texas A&M University
Youth development, race and ethnicity, outdoor recreation

§ Tabourne, Carla, Associate Professor
Ph.D., New York University
Recreation therapy, geriatrics, intergenerational programming, comprehensive program and patient management

■ *Music Education*

Addo, Akosua, Assistant Professor
Ph.D., University of British Columbia
Elementary general music, multicultural music, curriculum and instruction, related arts, multimedia ethnography

Furman, Charles E., Associate Professor
Ph.D., Florida State University
Music therapy, music education, psychology of music

Haack, Paul A., Professor
Ph.D., University of Wisconsin
Music education, psychology and sociology of music, aesthetics

Hamann, Keitha, Assistant Professor
Ph.D., University of Miami
Choral music education

Kimpton, Jeffrey, Professor
M.M., University of Illinois
Music and art administration, education reform, futurism in arts education and instrumental music

Teachout, David, Professor
Ph.D., Kent State University
Instrumental music methods and materials, quantitative research techniques, music technology, teacher development

■ *Work, Community, and Family Education*

Bartlett, Kenneth R., Assistant Professor
Ph.D., University of Illinois, Urbana-Champaign
Human resource development, adult education

Brown, James M., Professor
Ph.D., Bowling Green State University
Special learning needs, diversity in education and work settings

Copa, George H., Professor
Ph.D., University of Minnesota
Aims and curriculum of work, community, family education

Joerger, Richard, Assistant Professor
Ph.D., University of Minnesota
Agricultural, food, and environmental education

Johansen, Barry-Craig P., Assistant Professor
Ph.D., University of Minnesota
Human resource development, adult education

Jones, Stephan P., Associate Professor
Ph.D., Iowa State University
Agricultural education and extension, extension education

Krueger, Richard A., Professor
Ph.D., University of Minnesota
Program evaluation, focus group interviews

Lambrecht, Judith, Professor
Ph.D., University of Wisconsin
Business teacher education, instructional use of business software

Leske, Gary W., Associate Professor
Ph.D., University of Minnesota
Experiential education, leadership development

Lewis, Theodore, Professor
Ph.D., Ohio State University
Technology education curriculum, technology and work, workplace literacy

McClelland, Jerry, Associate Professor
Ph.D., Iowa State University
Family education, parent education

***§ McLean, Gary N., Professor**
Ed.D., Columbia University
International management development, organizational quality and productivity, keyboarding

Park, Rosemarie J., Professor
Ed.D., Harvard University
Adult literacy education, workplace literacy, women's issues

***§ Peterson, Roland L., Professor**
Ed.D., University of Nebraska
Integration of vocational and academic education, curricular development, decision-case development

Peterson, Shari L., Assistant Professor
Ph.D., University of Minnesota
Adult education, human resource development, career decision making

§ Plihal, Jane E., Associate Professor
Ph.D., University of Chicago
Research methodology, integration of vocational and academic education, international education

Pucel, David J., Professor
Ph.D., University of Minnesota
Education and training systems

Rohde, Nancy J., Assistant Professor
M.A., University of Minnesota; C.A.S., University of Wisconsin
Distance education, continuing education for adults

Rossmann, Marilyn Martin, Associate Professor
Ph.D., University of Minnesota
Family life education, parent education, sexuality education, work and family relationships

Ruhland, Shelia, Assistant Professor
Ph.D., University of Wisconsin
Continuing and vocational education

Stone III, James R., Associate Professor
Ed.D., Virginia Polytechnic Institute and State University
Education and work transitions for youth and adults, work-based learning

Swanson, Richard A., Professor
Ed.D., University of Illinois
Human resource development, cost-benefit analysis, performance improvement

§ Thomas, Ruth G., Professor
Ph.D., University of Minnesota
Thinking, learning, and teaching in context of everyday life

Yang, Baiyin, Assistant Professor
Ph.D., University of Georgia
Adult education, human resource development

Youth Development Leadership Cooperating Faculty

Baizerman, Michael, Professor
Ph.D., University of Pittsburgh
Everyday lives of youth; comprehensive work, community, and family education

McAvoy, Leo H., Professor
Ph.D., University of Minnesota
Recreation, outdoor education, adventure training

Schneider, Byron J., Associate Professor
Ph.D., University of Chicago
Education and youth policy

Walker, Joyce A., Professor
Ph.D., University of Minnesota
Community youth organizations, youth policy, youth development leadership

General College

Administration

David V. Taylor, Dean

Avelino Mills-Novoa, Assistant Dean and Director of Student Services

Terence G. Collins, Director of Academic Affairs and Curriculum

Rose M. Blixt, Senior Administrative Director

Nancy J. Hugg, Associate to the Dean

Kirsten Johnson, Development Director

Laura Weber, Communications Coordinator

Faculty

Adamson, William Delancey (Del), Associate Professor
Ph.D., University of Minnesota
Literature, film and the arts

*** Albrecht, Lisa D., Associate Professor**
Ph.D., State University of New York, Buffalo
Writing, women's literature, women's studies

*** Brothen, Thomas F., Professor**
Ph.D., University of Minnesota
Psychology

Brown, Katy Gray, Assistant Professor
Ph.D., University of Minnesota
Philosophy

Bruch, Patrick L., Assistant Professor
Ph.D., Wayne State University
Writing

*** Buckley, Thomas C., Associate Professor**
M.A., University of Minnesota
History

Choy, Gregory P., Assistant Professor
Ph.D., University of Washington
Literature

Chung, Carl J., Assistant Professor
Ph.D., University of Minnesota
Philosophy

*** Collins, Terence G., Professor**
Ph.D., University of Minnesota
Writing, literature

§ delMas, Robert C., Assistant Professor
Ph.D., University of Minnesota
Statistics, mathematics

Ghere, David L., Associate Professor
Ph.D., University of Maine
American history, world history, native American history, economics

*** Gidmark, Jill B., Professor**
Ph.D., University of North Dakota
Literature, writing

***§ Hatch, Jay T., Associate Professor**
Ph.D., University of Minnesota
Biology, environment

Higbee, Jeanne L., Professor
Ph.D., University of Wisconsin, Madison
Developmental education

Howarth, Heidi Barajas, Assistant Professor
Ph.D., University of Minnesota
Sociology

Hsu, Leonardo, Assistant Professor
Ph.D., University of California, Berkeley
Physics, physical science

Jacobs III, Walter R., Assistant Professor
Ph.D., Indiana University, Bloomington
Sociology

James, Patricia, Associate Professor
Ph.D., University of Minnesota
Art, creativity

*** Jensen, Murray S., Associate Professor**
Ph.D., University of Minnesota
Biology, anatomy, and physiology

*** Johnson, Allen B., Associate Professor**
Ph.D., University of Minnesota
Physical science

Kahn, Peter T., Assistant Professor
J.D., University of Minnesota
Law, social studies

*** Koch, Laura Coffin, Associate Professor**
Ph.D., University of Minnesota
Mathematics

***§ Kroll, Patrick A., Associate Professor**
M.A, University of Minnesota
Business studies, accounting

Lee, Amy M., Associate Professor
Ph.D., University of Massachusetts, Amherst
Writing

Miksch, Karen L., Assistant Professor
J.D., University of California, Berkeley
Law, social sciences

Moore, Randy, Professor
Ph.D., University California, Los Angeles
Biology, botany

Pedelty, Mark H., Associate Professor
Ph.D., University of California, Berkeley
Social sciences, anthropology

Reynolds, Thomas J., Assistant Professor
Ph.D., University of Minnesota
Writing

***§ Robertson, Douglas F., Professor**
Ph.D., University of Minnesota
Mathematics, computing

*** Sirc, Geoffrey M., Professor**
Ph.D., University of Minnesota
Writing

Taylor, David V., Associate Professor and Dean
Ph.D., University of Minnesota
History, history of African people

Thoen, Gail A., Assistant Professor
Ph.D., University of Minnesota
Family studies

Uthe, Richard Edward (Rick), Associate Professor
Ph.D., University of New Brunswick
General chemistry, geology, physical science

*** Wambach, Cathrine A., Associate Professor**
Ph.D., University of Minnesota
Psychology

Yahnke, Robert E., Professor
Ph.D., University of Wisconsin, Madison
Literature, film and the arts

College of Human Ecology

Administration

Shirley L. Baugher, Dean

Daniel Gallaher, Associate Dean for Undergraduate Programs

Catherine Solheim, Associate Dean for Outreach

Beth Emshoff, Director of Continuing Education and Professional Development and Director of External Relations

Katherine Maple, Director, Academic Student Services

John Sonnack, Director, Information Technology

Program Committee Chairpersons

Karen LaBat—Clothing Design

Carol Waldron—Graphic Design

William Goodman—Family Social Science

Zata Vickers—Food Science

Ann Ziebarth—Housing Studies

Denise Guerin—Interior Design

David E. Smith—Nutrition

Kim K. P. Johnson—Retail Merchandising

Faculty

■ *Design, Housing, and Apparel*

Angell, William J., Professor
M.S., Iowa State University
Indoor air quality in residential, school, and health care environments

Bruin, Marilyn J., Assistant Professor
Ph.D. Iowa State University
Housing and neighborhood environments of low-income households, barriers to adequate, affordable, stable housing

Boyd-Brent, James, Assistant Professor
M.F.A., University of Minnesota
Drawing, print making, alternative design technologies

Bye, Elizabeth, Assistant Professor
Ph.D., University of Minnesota
Apparel technology, textile product development, sizing/fit

Chu, Sauman S., Assistant Professor
Ph.D., University of Minnesota
Multiculturalism/design education, cross-cultural differences in design

Crump, Jeffrey, Associate Professor
Ph.D., University of Nebraska, Lincoln
Affordable housing, public housing policy, immigrant housing, landscape and urban places

DeLong, Marilyn R., Professor
Ph.D., Ohio State University
Aesthetics and historic aspects of clothing

Eicher, Joanne B., Regents Professor
Ph.D., Michigan State University
Dress as communication, art form, and identity

Gahring, Sherri A., Associate Professor
M.S., Iowa State University
Interactions between consumers and textile and apparel products, electronic commerce for small textile and apparel businesses

Ginthner, Delores A., Associate Professor
M.A., University of Minnesota
Lighting design, environmental issues, life safety in design

***§ Guerin, Denise A., Professor**
Ph.D., Michigan State University
Sustainable interior design, relationship of culture and design

Hokanson, Brad, Assistant Professor
Ph.D., University of Minnesota
Computer interface design, speech synthesis, generated poetry, imaging

Johnson, Kim K. P., Professor and Director of Graduate Studies
Ph.D., University of Wisconsin, Madison
Social psychology of dress, consumer behavior, and retailing

LaBat, Karen L., Associate Professor
Ph.D., University of Minnesota
Textile product development, user group psychological/physical needs

Martinson, Barbara E., Associate Professor
Ph.D., University of Minnesota
Design education/design history/ communication and perception

McCarthy, Steven, Associate Professor
M.F.A., Stanford University
Self-authored graphic design, artist's books, interactive design

Shen, F. Lindsay, Assistant Professor
Ph.D., University of St. Andrews
History of furniture and decorative arts, contemporary design in Minnesota

Waldron, Carol C., Assistant Professor
M.A., University of Minnesota
Typography, books, material, color, legibility, and expression

Watson, Stephanie A., Assistant Professor
Ed.D., University of Arkansas
Regional and vernacular architecture, student learning and development, interior textiles performance

Williams, Gloria M., Associate Professor
Ph.D., University of Minnesota
Knowledge of structures, ideologies appearance, textile/apparel labor issues

Yust, Becky Love, Associate Professor and Department Head
Ph.D., Ohio State University
Social and technological aspects of housing

Ziebarth, Ann C., Associate Professor
Ph.D., Louisiana State University
Housing policy, rural/small town housing, housing affordability/availability

The Goldstein Museum of Design

Lindsay Shen, Director

Marilyn DeLong, Costume Curator

Steven McCarthy, Graphic Design Curator

Gloria Williams, Textiles Curator

■ *Family Social Science*

Bauer, Jean, Professor
Ph.D., University of Illinois, Champaign-Urbana
Family economic well-being, welfare reform, family policy

Baugher, Shirley, Professor, Dean
Ph.D., University of Missouri, Columbia
Leadership, strategic planning, human ecology

Boss, Pauline, Professor
Ph.D., University of Wisconsin, Madison
Family stress, ambiguous loss, family caregiving, immigrant families

Caron, Wayne, Lecturer
Ph.D., University of Minnesota
Family gerontology, aging families, family relationships

Danes, Sharon, Professor
Ph.D., Iowa State University
Family financial issues, family businesses, work and family

***§ Detzner, Daniel, Professor**
Ph.D., University of Minnesota
Aging families, refugee families, bi-cultural parent education

Doherty, William, Professor
Ph.D., University of Connecticut
Family relationships, marriage and family therapy, fatherhood, ethics

Goodman, William J., Teaching Associate Professor
Ph.D., Purdue University
Undergraduate education, field study supervision, marriage and family therapy, gay/lesbian families

§ Grotevant, Harold D., Professor and Department Head
Ph.D., University of Minnesota
Adoptive families, adolescent development, identity development, family assessment

Heltsley, Mary E., Professor
Ph.D., Pennsylvania State University
Leadership, human resource development, gender roles, family policy

Hogan, M. Janice, Professor
Ph.D., Michigan State University
Decision making, financial issues, resource management, family ecology

Maddock, James, Professor
Ph.D., University of Chicago
Sexuality in families, marital and family therapy, ethics

Rettig, Kathryn, Professor
Ph.D., Michigan State University
Justice issues, family decision-making, legal-economic conflicts

*** Rosenblatt, Paul C., Professor**
Ph.D., Northwestern University
Family loss, business families, family diversity, family theory

Rueter, Martha, Assistant Professor
Ph.D., Iowa State University
Rural families, developmental family psychopathology, vulnerable rural youth

Solheim, Catherine, Associate Professor
Ph.D., University of Minnesota
Family resources, cultural diversity, gender roles

Stum, Marlene, Associate Professor
Ph.D., University of Wisconsin, Madison
Aging families, long-term care, intergenerational resource transfers

Turner, William L., Professor
Ph.D., Virginia Polytechnic Institute and State University
Drug and alcohol abuse, marriage and family therapy, African-American families

Wieling, Elizabeth, Assistant Professor
Ph.D., Iowa State University
Cross-cultural families, intercultural marriages, marriage and family therapy, Hispanic families

Zuiker, Virginia S., Assistant Professor
Ph.D., Ohio State University
Family resources, home-based employment, Hispanic family economics

■ *Food Science and Nutrition*

Addis, Paul B., Professor
Ph.D., Purdue University
Lipid oxidation, fatty acids, atherosclerosis, food chemical toxicology

Brady, Linda J., Professor
Ph.D., Michigan State University
Effects of diet on intestinal microflora and health, Latino nutrition education

Csallany, A. Saari, Professor
D.Sc., University of Technical Science, Budapest, Hungary
Lipid chemistry, nutritional biochemistry, free radicals, oxidative degradation

Diez-Gonzalez, Francisco, Assistant Professor
Ph.D., Cornell University
Food-borne pathogens, mechanisms of survival in foods and environment, methods to prevent food contamination

Feirtag, Joellen M., Associate Professor
Ph.D., University of Minnesota
Food safety/HACCP, ATP bioluminescence, prebiotic/probiotic physiology

Fulcher, R. Gary, Professor and General Mills Land Grant Chair in Cereal Chemistry and Technology
Ph.D., Monash University
Structure/function relationships in cereal grains/cereal products

§ Gallaher, Daniel D., Professor
Ph.D., University of California, Davis
Diet/colon cancer relationships, fat/fiber in diet

Hassel, Craig A., Associate Professor
Ph.D., University of Arizona
Non-biomedical approaches to food, nutrition, and health

§ Kurzer, Mindy S., Professor
Ph.D., University of California, Berkeley
Dietary regulation of hormones, phytoestrogens, diet and cancer

***§ Labuza, Theodore P., Professor**
Ph.D., Massachusetts Institute of Technology
Shelf life/chemical deterioration of foods, moisture transport, food law

*** McKay, Larry L., Professor**
Ph.D., Oregon State University
Food fermentations/genetics/ biotechnology of lactic acid bacteria

Metzger, Lloyd E., Assistant Professor
Ph.D., Cornell University
Evaluation of cheese functionality and manufacturing parameters

O'Sullivan, Daniel J., Associate Professor
Ph.D., University of College Cork, Ireland
Molecular genetics of lactic acid bacteria, bacteriophage resistance

Parks, Elizabeth J., Assistant Professor
Ph.D., University of California, Davis
Alternatives in glucose and fat metabolism in human disease states

Peterson, Carolyn M., Assistant Clinical Specialist
M.S., University of Minnesota
Dietetic education, sports nutrition

Reicks, Marla M., Associate Professor
Ph.D., Iowa State University
Diet/cancer prevention, nutrition education for low income groups

Reineccius, Gary A., Professor
Ph.D., Pennsylvania State University
Analysis of food flavors, losses during spray drying

Sapakie, Sidney F., Senior Fellow
M.B.A., University of Minnesota
Product development, food processing

Schafer, H. William, Associate Professor
Ph.D., University of Wisconsin, Madison
Food safety/quality, naturally occurring antimicrobial compounds/antioxidants

Schlegel, Gail J., Assistant Clinical Specialist
M.P.H., University of California, Los Angeles
Diabetes education, complementary health care, diet and chronic disease

Slavin, Joanne L., Professor
Ph.D., University of Wisconsin
Dietary fiber, diet/cancer/exercise, human feeding studies

Smith, Chery F., Assistant Professor
Ph.D., Indiana University
Domestic and international community nutrition issues

§Smith, David E., Professor
Ph.D., University of Wisconsin
Effects of technology/new ingredients on dairy products

Tatini, Sita R., Professor
Ph.D., University of Minnesota
Control food-borne pathogens, use of natural antimicrobials

Vickers, Zata M., Professor
Ph.D., Cornell University
Pleasantness/acceptability of foods, attributes and food preferences

§ Warthesen, Joseph J., Professor and Department Head
Ph.D., Oregon State University
Chemical reactions in food/food analysis, processing/storage

■ *School of Social Work*

Abrams, Laura, Assistant Professor
Ph.D., University of California
Adolescent behavior and development, social welfare history, school-linked services, gender and sexuality

Baizerman, Michael, Professor
Ph.D., University of Pittsburgh
Adolescent and youth studies, youth public policy, adolescent female prostitution

Beeman, Sandra, Associate Professor
Ph.D., University of Chicago
Child abuse and neglect, violence against women, qualitative research methods, children and families in poverty

Beker, Jerome, Professor
Ed.D., Columbia University
Group care programs for youth, preparation/professionalization of youth workers, youth organizations

Bradshaw, William, Associate Professor
Ph.D., University of Southern California
Psychopathology, victim-offender mediation, cognitive-behavioral therapy, group therapy

Burke, Kevin, Education Specialist
Ph.D., University of Chicago
Field instruction, public health, socially marginal groups, chronic illness

Davila-Williams, Sonia, Coordinator
M.S.W., University of Pittsburgh
Child welfare, elder mistreatment, services for Chicano/Latino clients, field instruction

Dimock, Peter, Teaching Specialist
M.S.W., University of Minnesota
Technology-enhanced learning, chemical dependency education, psychopharmacology, social work/client relationships

Edleson, Jeffrey, Professor
Ph.D., University of Wisconsin, Madison
Social work research methods, family violence, electronic information

Gibson, Priscilla, Assistant Professor
Ph.D., University of Denver
African American grandmothers, child sexual abuse, development of violent behavior, resilience, research methods

Gilgun, Jane F., Professor
Ph.D., Syracuse University
Child welfare, child sexual abuse, development of violent behavior

Hendrickson, Trude, Education Specialist
M.S.W., University of Iowa
Child welfare, rural social work, ethical dilemmas in field placements

Hollister, C. David, Professor
Ph.D., University of Michigan
Program evaluation, organizational analysis of social services, substance abuse and child welfare

Jefferys, Marcie, Program Director
M.A., University of Chicago
Child welfare policy and practice, family policy, welfare reform, public finance issues

Jones, Linda, Associate Professor
Ph.D., University of Wisconsin, Madison
Lesbian and gay families, women and social policy issues

Kalke, Nan, Education Specialist
M.S.W., University of Minnesota, Duluth
Family preservation, child welfare, distance education, multi-media courses

Kivnick, Helen Q., Professor
Ph.D., University of Michigan
Life strengths, CitySongs project, elder role models, life-cycle therapy

Lightfoot, Elizabeth, Assistant Professor
Ph.D., Indiana University at Bloomington
Social welfare policy, disability policy, strategic planning

Lum, Terry, Assistant Professor
Ph.D., Washington University
Public policy analysis and evaluation, social, economic, and political environments, health care policy

McGee, Gloria, Coordinator and Instructor
M.S.W., University of Minnesota
Field education, child welfare, substance abuse and social work

Menanteau-Horta, Dario, Professor
Ph.D., University of Minnesota
Social organization, community change, rural development, Latin America

Michaels, Caroline, Associate Program Director
M.P.H., University of North Carolina at Chapel Hill
Violence-related higher education curriculum development, social influence among adolescents

Miedema, Janelle, Education Specialist
M.S.W., University of North Dakota
Children, youth, and families, distance education, rural field instruction

Morrissey, Megan, Coordinator and Lecturer
Ph.D., University of Minnesota
Social welfare history and policy, social history of American women

Quam, Jean K., Professor
Ph.D., University of Wisconsin, Madison
Aging, older women, chronically mentally ill, history of social work

Reinardy, James, Associate Professor
Ph.D., University of Minnesota
Long-term care issues, assessment of older adults, social welfare policy, community organization.

Rooney, Ronald, Professor
Ph.D., University of Chicago
Work with involuntary clients, time-limited practice, public social services

Taylor, Edward, Associate Professor
Ph.D., University of Southern California
Children and adolescents with serious mental disorders, mental illness and violence, social intelligence/social competence in children

Umbreit, Mark, Professor
Ph.D., University of Minnesota
Mediation and conflict resolution, criminal justice, victim issues, violence prevention

Van Slyke, Victoria, Coordinator
Ph.D., University of Minnesota
Forensic practice, changing models of supervision, impact of trauma

Wattenberg, Esther, Professor
M.A., University of Toronto, M.A., University of Chicago
Child welfare, welfare reform

Wells, Susan, Gamble-Skogmo Professor
Ph.D., University of Southern California
Evaluation of child welfare and foster care service quality and outcomes; child welfare service delivery; issues of diversity in practice, policy, and evaluation in child welfare

Williams, Oliver, Associate Professor
Ph.D., University of Pittsburgh
Domestic violence, homelessness, families and children, aging, ethno-cultural issues

College of Liberal Arts

Administration

Steven J. Rosenstone, Dean

Richard Skaggs, Interim Associate Dean for Academic Programs

James Parente, Associate Dean for Faculty

Barbara Reid, Associate Dean for Planning and Initiatives

Suzanne Bardouche, Chief Financial Officer

Chris Kearns, Assistant Dean of Student Services

Richard McCormick, Director of Honors Division

José Beruvides, Associate Director of Martin Luther King Program

Carl Brandt, Director of Office of Special Learning Opportunities

Mary Hicks, Director of External Relations

Francine Morgan, Director of Human Resources

Faculty

■ *African American and African Studies*

Atkins, Keletso, Associate Professor
Ph.D., University of Wisconsin, Madison
South African history

*** Brewer, Rose, Associate Professor**
Ph.D., Indiana University
Sociology

Coifman, Victoria, Assistant Professor
Ph.D., University of Wisconsin, Madison
African history

Farah, Caesar, Professor
Ph.D., Princeton University
Arabic and Islamic studies

Khalek, Hisham, Teaching Specialist
M.A., University of Minnesota
Political science

Martinez, David, Assistant Professor
Ph.D., SUNY, Stony Brook
Philosophy and American Indian religions

McCurdy, Ronald, Professor
Ph.D., University of Kansas
Jazz ensemble, vocal jazz, jazz improvisation, Afro-American studies

McDowell, Winston C., Visiting Assistant Professor
Ph.D., University of Minnesota
History

Nichols, John, Professor
Ph.D., Harvard University
Linguistics, language planning, oral literature and folklore, ethnohistory and traditional arts

Pate, Alexs, Visiting Assistant Professor
B.A., Temple University
Journalism, political science

Pike, Charles, Assistant Professor
Ph.D., University of Wisconsin, Madison
African language and literature

*** Reyes, Angelita, Associate Professor**
Ph.D., University of Iowa
Comparative literature

Taborn, John, Associate Professor
Ph.D., University of Minnesota
Psychology

Wright, John, Associate Professor
Ph.D., University of Minnesota
Afro-American literature

■ *American Indian Studies*

Albers, Patricia, Professor
Ph.D., University of Wisconsin
Anthropology, ethnohistory

Child, Brenda, Associate Professor
Ph.D., Iowa State University
History, American Indian boarding schools, multiculturalism

*** Miller, Carol, Associate Professor**
Ph.D., University of Oklahoma
American Indian women's narratives, intercultural studies, American literatures

O'Brien-Kehoe, Jean, Associate Professor
Ph.D., University of Chicago
Indians of the Northeast, U.S. colonial history

Wilkins, David, Associate Professor
Ph.D., University of North Carolina, Chapel Hill
American Indian sovereignty, tribal government, comparative politics

■ *American Studies*

Child, Brenda, Associate Professor
Ph.D., Iowa State University
History, American Indian boarding schools, multiculturalism

Choy, Catherine, Assistant Professor
Ph.D., University of California, Los Angeles
Asian Americans, immigration, Philippine history, history of medicine

Delattre, Roland, Professor Emeritus
Ph.D., Yale University
Religion and ethics

Ferguson, Roderick, Assistant Professor
Ph.D., University of California, San Diego
Social theory, race, sexuality, gender

§ May, Elaine Tyler, Professor
Ph.D., University of California, Los Angeles
History, women and family

*** May, Lary, Professor**
Ph.D., University of California, Los Angeles
Post-World War II American history, popular culture

*** Miller, Carol, Associate Professor**
Ph.D., University of Oklahoma
American literatures, American Indian women's narratives, intercultural studies

*** Noble, David, Professor**
Ph.D., University of Wisconsin, Madison
History, literature and language, philosophy and religion

Pierce, Jennifer, Associate Professor
Ph.D., University of California, Berkeley
Gender, social psychology and race

Prell, Riv-Ellen, Professor
Ph.D., University of Chicago
Anthropology of American Jews and Judaism, ethnicity and gender

Yates, Gayle Graham, Professor
Ph.D., University of Minnesota
American women's literature and cultures of the 20th century; contemporary American religions

■ *Anthropology*

Berdahl, Daphne, Assistant Professor
Ph.D., University of Chicago
Sociocultural anthropology, identity, consumption, memory, gender, Europe, United States

Barlow, Kathleen, Assistant Professor
Ph.D., University of California, San Diego
Psychological anthropology, culture and learning, art and aesthetics; Melanesia

Dunnigan, Timothy, Associate Professor
Ph.D., University of Arizona
Semantic anthropology, linguistic acculturation, Middle America, North America

Gerlach, Luther, Professor Emeritus
Ph.D., University of London
Natural resources, social movements, political ecology, Africa, United States

Gibbon, Guy, Professor
Ph.D., University of Wisconsin, Madison
North American archaeology, history and theory of archaeology, Midwest

Gudeman, Stephen, Professor
Ph.D., University of Cambridge, England
Social, structural, economic anthropology; Latin America

Ingham, John M., Professor
Ph.D., University of California, Berkeley
Culture and personality, symbolic anthropology, Middle America

Jeganathan, Pradeep, Assistant Professor
Ph.D., University of Chicago
Anthropology of violence, colonialism, nationalism

Laden, Greg, Assistant Professor
Ph.D., Harvard University
Human evolution and paleoanthropology, archaeology of Africa, North American prehistoric and historic archaeology

Langford, Jean, Assistant Professor
Ph.D., University of Washington
Cultural anthropology, medical anthropology, postcolonial theory, politics of representation

Lipset, David M., Associate Professor
Ph.D., University of California, San Diego
Social and political anthropology, history of anthropology; Melanesia

Miller, Frank, Professor
Ph.D., Harvard University
Change, development strategies, applied anthropology, Middle America, North America

Ogan, Eugene, Professor Emeritus
Ph.D., Harvard University
Social anthropology, Pacific Island ethnology and history

***§ Penn, Mischa, Associate Professor**
B.A., University of Minnesota
Philosophical anthropology, culture theory, methodology, history of anthropology

Raheja, Gloria Goodwin, Professor
Ph.D., University of Chicago
Social, cultural; gender, caste; language; colonial discourses; India

Rowe, William, Professor Emeritus
Ph.D., Cornell University
Sociocultural change, colonialism, Marxism, South Asia, New Guinea, Caribbean

***§ Spector, Janet, Associate Professor Emeritus**
Ph.D., University of Wisconsin, Madison
Archaeology, ethnohistory, environmental archaeology, feminist anthropology, North America

Tappen, Martha, Assistant Professor
Ph.D., Harvard University
Paleoanthropology, paleoenvironments, taphonomy and faunal analysis, ethnoarcheology

Taussig, Karen-Sue, Assistant Professor
Ph.D., Johns Hopkins University
Social-cultural anthropology, science and technology (genetics, biotechnologies), medical anthropology, Europe, United States

Tostevin, Gilbert, Assistant Professor
Ph.D., Harvard University
Paleolithic archaeology, paleoanthropology, prehistoric technology, Old World prehistory, material-culture studies, culture-contact studies

Wells, Peter S., Professor
Ph.D., Harvard University
Culture contact, economic behavior, signs and symbols, prehistoric and medieval Europe

■ *Art*

Baldwin, Guy, Associate Professor
M.F.A., University of Wisconsin
Sculpture

Bauemler, Christine, Assistant Professor
M.F.A., Indiana University
Drawing, painting

Bethke, Karl, Professor
M.F.A., University of Minnesota
Printmaking

Bohls, Margaret, Assistant Professor
M.F.A., Louisiana State University
Ceramics

Cowette, Thomas, Associate Professor
B.F.A., Minneapolis College of Art and Design
Drawing, painting

Feinberg, David, Associate Professor
M.F.A., Cranbrook Academy of Art
Drawing, painting

Franklin, Marjorie, Assistant Professor
M.F.A., San Francisco State University
Electronic arts

Geschke, Erik, Assistant Professor
M.F.A., Maryland Institute
Sculpture

Gray, Lynn, Associate Professor
M.F.A., University of Oklahoma
Drawing, painting

Hallman, Gary, Associate Professor
M.F.A., University of Minnesota
Photography

Henkel, James, Associate Professor
M.F.A., Florida State University
Photography

Hoard, Curtis, Professor
M.F.A., University of Wisconsin
Ceramics

Katsiaficas, Mary Diane, Professor
M.F.A., University of Washington, Seattle
Drawing, painting

Krepps, Jerald, Associate Professor
M.F.A., Indiana University
Printmaking

Kuhr, Alexis, Assistant Professor
M.F.A., Stanford University
Drawing, painting

Lane, Thomas, Associate Professor
M.F.A., Pennsylvania State University
Ceramics

Lucey, Susan, Associate Professor
M.F.A., Temple University
Sculpture

Lukkas, Lynn, Assistant Professor
M.F.A., Rhode Island School of Design
Time and interactivity

§ Lyon, Joyce, Associate Professor
M.F.A., University of Minnesota
Drawing, painting

Morgan, Clarence, Professor
M.F.A., University of Pennsylvania
Drawing, painting

Nakajima, Ryuta, Assistant Professor
M.F.A., University of California, San Diego
Drawing, painting

Pharis, Mark, Professor
University of Minnesota
Ceramics

Potratz, Wayne, Professor
M.A., University of California, Berkeley
Sculpture

Rose, Thomas, Professor
M.A., University of California, Berkeley
Sculpture

■ *Art History*

Asher, Catherine, Associate Professor
Ph.D., University of Minnesota
Islamic and South Asian art and culture

Asher, Frederick, Professor
Ph.D., University of Chicago
South Asian sculpture and architecture

*** Cooper, Frederick, Professor**
Ph.D., University of Pennsylvania
Greek art and architecture

Marling, Karal Ann, Professor
Ph.D., Bryn Mawr College
American art and popular culture

McNally, Sheila, Professor
Ph.D., Harvard University
Greek and Roman art and archaeology

Poor, Robert, Professor
Ph.D., University of Chicago
East Asian art

Silberman, Robert, Associate Professor
Ph.D., Columbia University
Film studies, history of photography, 20th-century American art

Steyaert, John, Associate Professor
Ph.D., University of Michigan
Northern European art, 14th-16th centuries; late Gothic sculpture

Stoughton, Michael, Associate Professor
Ph.D., University of Michigan
European painting, sculpture, and architecture, 17th-18th centuries

Weisberg, Gabriel, Professor
Ph.D., Johns Hopkins University
19th/early 20th-century art, decorative arts, graphic arts

■ *Asian Languages and Literatures*

Allen, Joseph, Professor
Ph.D., University of Washington
Chinese literature and culture, Taiwan studies

Anderson, Mark, Assistant Professor
Ph.D., Cornell University
Japanese literature, film studies, gender, postcolonialism, science and technology, Marxism

Hsiao, Li-ling, Assistant Professor
D.Phil., Oxford University
Chinese literature, theater, art, philosophy, film studies.

Molasky, Michael, Associate Professor
Ph.D., University of Chicago
Modern Japanese literature, U.S. occupation era, Okinawa, race, gender, jazz

Morinaga, Maki, Assistant Professor
Ph.D., University of Pennsylvania
Japanese literature and theater, women's studies and gender studies

Schaefer, William, Assistant Professor
Ph.D., University of Chicago
Modern Chinese literature and culture; comparative studies in visual and verbal culture; photography; global modernism; literary, ethnographic, and historical narrative

■ *Chicano Studies*

Rojas, Guillermo, Associate Professor
Ph.D., University of Illinois
Chicano literature

Valdés, Dennis, Associate Professor
Ph.D., Michigan State University
Chicano history, labor history

Torres, Eden, Assistant Professor
Ph.D., University of Minnesota
Chicano studies

■ *Classical and Near Eastern Studies*

Belfiore, Elizabeth, Professor
Ph.D., University of California, Los Angeles
Greek literature, Greek tragedy, philosophy

Berlin, Andrea, Assistant Professor
Ph.D., University of Michigan
Greek, Roman, and Near Eastern archeology; ancient ceramics

*** Cooper, Frederick, Professor**
Ph.D., University of Pennsylvania
Greek, Roman art and archaeology, architecture, folklore

*** Erickson, Gerald, Professor Emeritus**
Ph.D., University of Minnesota
Language pedagogy, social history

Hershbell, Jackson, Professor
Ph.D., Harvard University
Greek literature, philosophy, intellectual history

Keuls, Eva, Professor Emeritus
Ph.D., Columbia University
Greek literature, fine arts, social history

Krevans, Nita, Associate Professor
Ph.D., Princeton University
Hellenistic and Roman literature

Lardinois, André, Assistant Professor
Ph.D., Princeton University
Greek literature, mythology, women's studies

Levinson, Bernard, Associate Professor and Berman Family Chair in Jewish Studies and Hebrew Bible
Ph.D., Brandeis University
Bible, ancient Near Eastern law

Malandra, William, Associate Professor
Ph.D., University of Pennsylvania
Indo-Iranian philology, history of religions

McNally, Sheila, Professor
Ph.D., Harvard University
Greek and Roman art and archaeology

§ Nicholson, Oliver, Associate Professor
D.Phil., Oxford University
Late antiquity, later Latin, church history, Byzantium

Olson, S. Douglas, Associate Professor
Ph.D. Bryn Mawr College
Greek poetry

Paradise, Jonathan, Associate Professor
Ph.D., University of Pennsylvania
Ancient Mesopotamia, Hebrew lexicography, language pedagogy, biblical studies

Sellew, Philip, Associate Professor
Th.D., Harvard University
New Testament, early church, Greco-Roman religions, Coptic

Sheets, George, Associate Professor
Ph.D., Duke University
Roman literature, historical linguistics, legal theory

Sonkowsky, Robert, Professor
Ph.D., University of North Carolina
Latin literature, oral performance, theater, rhetoric, interactive TV teaching

von Dassow, Eva, Assistant Professor
Ph.D., New York University
Bible and ancient Near East

■ *Communication Disorders*

Avery, Jack, Assistant Clinical Specialist
Ph.D., University of Minnesota
Adult speech and language disorders, traumatic brain injury, alaryngeal speech

Broen, Patricia, Professor Emeritus
Ph.D., University of Minnesota
Language acquisition, phonological development

Carlstrom, Jane, Clinical Specialist
M.A., University of Iowa
Clinical audiology

Carney, Arlene, Professor
Ph.D., University of Minnesota
Rehabilitative audiology, speech perception

Davis, Julia, Professor Emeritus
Ph.D., University of Southern Mississippi
Rehabilitative audiology

Donaldson, Gail, Adjunct Assistant Professor
Ph.D., University of Virginia
Audiology

Doyle, Timothy N., Adjunct Assistant Professor
Ph.D., University of Minnesota
Audiology

Fabry, David A., Adjunct Associate Professor
Ph.D., University of Minnesota
Audiology

Glaze, Leslie, Associate Clinical Specialist
Ph.D., University of Wisconsin
Voice and resonance disorders, alaryngeal speech

Gundel, Jeanette, Adjunct Professor
Ph.D., University of Texas
Syntax, semantics, pragmatics

Haroldson, Samuel, Professor Emeritus
M.A., University of Minnesota
Stuttering, laryngectomy

Hinderscheit, Linda, Clinical Specialist
M.A., University of Minnesota
Speech and language disorders

Javel, Eric, Adjunct Associate Professor
Ph.D., University of Pittsburgh
Bioacoustics

Kennedy, Mary, Assistant Professor
Ph.D., University of Washington
Neurological disorders of communication

Kohnert, Kathryn, Assistant Professor
Ph.D., University of California, San Diego
Language acquisition and disorders in bilingual and monolingual populations

McDermott, Richard, Professor Emeritus
Ph.D., University of Iowa
Phonological disorders

Moller, Karlind, Adjunct Professor
Ph.D., University of Minnesota
Craniofacial anomalies

Munson, Benjamin, Assistant Professor
Ph.D., Ohio State University
Phonological development and disorders in children, language disorders in children

Nelson, David, Adjunct Professor
Ph.D., University of Minnesota
Electrically stimulated hearing, otoacoustic emissions

Nelson, Peggy, Assistant Professor
Ph.D., University of Kansas
Psychoacoustics and speech perception, signal processing in hearing aids, pediatric audiology

Reichle, Joe, Professor
Ph.D., University of Wisconsin
Preschool language, augmentative communication

Schlauch, Robert, Associate Professor
Ph.D., University of Washington
Diagnostic audiology, cognitive influences on hearing

§ Siegel, Gerald, Professor Emeritus
Ph.D., University of Iowa
Stuttering, ethnographic approaches to communication disorders

***§ Speaks, Charles, Professor**
Ph.D., University of Michigan
Speech perception

Trine, Timothy D., Adjunct Assistant Professor
Ph.D., University of Minnesota
Hearing aids

van Deusen, Diana, Associate Clinical Specialist
M.A., University of Iowa
Clinical audiology, aural rehabilitation

Van Tasell, Dianne J., Adjunct Professor
Ph.D., Northwestern University
Hearing aids

Viemeister, Neal, Adjunct Professor
Ph.D., Indiana University
Auditory perception, psychophysics

Windsor, Jennifer, Professor
Ph.D., Purdue University
Language acquisition and disorders

■ *Communication Studies*

Albert, Rosita, Associate Professor
Ph.D., University of Michigan
Intercultural communication, international relations, cross-cultural methods, health communication

Bormann, Ernest G., Professor Emeritus
Ph.D., University of Iowa
Rhetorical theory, American public address; small group communication

Browne, Donald, Professor
Ph.D., University of Michigan
Comparative international media, media and minorities, historical research methodology

Campbell, Karlyn Kohrs, Professor
Ph.D., University of Minnesota
Rhetorical theory/criticism, women in communication, presidential rhetoric

Greene, Ronald W., Assistant Professor
Ph.D., University of Illinois
Rhetorical studies, cultural studies/policy, citizenship philosophy of communication

Hewes, Dean, Professor
Ph.D. Florida State University
Communication theory, small group and organization decision-making

Jensen, J. Vernon, Professor Emeritus
Ph.D., University of Minnesota
British public address, argumentation, ethics, rhetoric in Asia

Kinney, Terry, Assistant Professor
Ph.D., University of Wisconsin
Interpersonal communication and aggression, persuasion and social influence, health, methodology

Koerner, Ascan, Assistant Professor
Ph.D., University of Wisconsin
Cognitive processes in interpersonal communication, marital and family communication, persuasion

Rarick, David, Associate Professor
Ph.D., Ohio State University
Communication theory, media ethics, audience analysis, telecommunications media

Schiappa, Edward, Professor
Ph.D., Northwestern University
Contemporary rhetorical theory, classical rhetoric, public address, argumentation

§ Scott, Robert, Professor Emeritus
Ph.D., University of Illinois
Rhetorical theory, public address criticism, value implications in research

Shapiro, George L., Professor Emeritus
Ph.D., University of Minnesota
Leadership, organizational and interpersonal communication, communication between subcultures

Sheldon, Amy, Professor
Ph.D., University of Texas
First- and second-language acquisition, discourse analysis, gender

Vavrus, Mary, Assistant Professor
Ph.D., University of Illinois
Media studies, feminist theory, cultural studies, critical theory

§ Wilson, Kirt, Assistant Professor
Ph.D., Northwestern University
Rhetorical theory, rhetoric, U.S. public address, political persuasion

■ *Cultural Studies and Comparative Literature*

§ Archer, W. John, Associate Professor
Ph.D., Harvard University
History of architecture, landscape, cities and suburbs

Brennan, Timothy, Associate Professor
Ph.D., Columbia University
20th-century literature, intellectuals; cultural theory; new media; imperialism

***§ Brown, Robert, Associate Professor**
Ph.D., University of Michigan
Rhetoric, language theory, discourse analysis, pedagogy, disciplinarity

Casarino, Cesare, Assistant Professor
Ph.D., Duke University
Queer theory, cinema, literature, philosophy

Ganguly, Keya, Associate Professor
Ph.D., University of Illinois, Urbana-Champaign
Cultural theory, film studies, postcolonialism, Marxism, ethnographic criticism

*** Leppert, Richard, Professor**
Ph.D., Indiana University
Music and visual culture—17th-20th centuries, critical theory

Liu, Catherine, Associate Professor
Ph.D., City University of New York
Psychoanalysis and historiography, theories of the novel, technology, sexual difference

Mowitt, John, Associate Professor
Ph.D., University of Wisconsin
Critical theory, cultural technologies and popular practices

Pepper, Thomas, Associate Professor
Ph.D., Yale University
Textual theory, gender, psychoanalysis, philosophical narrative, poetry, trauma

Sarles, Harvey, Professor
Ph.D., University of Chicago
Pragmatism, teaching as dialogue, science and humanities, cultural pluralism

Schulte-Sasse, Jochen, Professor
Dr. ph. habil., Ruhr University, Bochum, Germany
Intellectual/cultural history, critical theory, psychoanalysis, popular culture

*** Thomas, Gary, Associate Professor**
Ph.D., Harvard University
Cultural musicology, gender, comic theory, queer theory

■ *Economics*

Allen, Beth, Professor
Ph.D., University of California, Berkeley
Game theory, economics of information and uncertainty

Bassetto, Marco, Assistant Professor
Ph.D., University of Chicago
Macroeconomic theory, applications of game theory to macroeconomics, design and consistency of macroeconomic policy

Boldrin, Michele Professor
Ph.D., University of Rochester
Development and use of dynamic general equilibrium models

Chari, V. V., Professor
Ph.D., Carnegie Mellon University
Public economics, macroeconomics, industrial organization

Chipman, John S., Regents Professor
Ph.D., Johns Hopkins University
Econometrics, international trade, measurement of economic welfare

Coen, Edward, Professor Emeritus
Ph.D., London School of Economics
Welfare economics, international economics

De Nardi, Cristina, Assistant Professor
Ph.D., University of Chicago
Macroeconomics, wealth distribution, social security

Eckstein, Zvi, Professor
Ph.D., University of Minnesota
Immigration and transition of immigrants to a new labor market, labor search models, labor market discrimination

Feldman, Roger D., Professor
Ph.D., University of Rochester
Health economics, labor economics, human capital, human resources

Foster, Edward, Professor
Ph.D., Massachusetts Institute of Technology
Public finance, microeconomic theory

Gowisankaran, Gautam, Assistant Professor
Ph.D., Yale University
Applied microeconomics, industrial organization, computational economics, health economics

Holmes, Tom, Associate Professor
Ph.D., Northwestern University
Applied microeconomics, industrial organization

Hurwicz, Leonid, Regents Professor Emeritus
LL.M., Warsaw University
Mathematical economics, economic organization, welfare economics, social choice

Jones, Larry, Professor
Ph.D., University of California, Berkeley
Macroeconomic theory with emphasis on development and growth and public finance

Kehoe, Timothy, Distinguished McKnight University Professor
Ph.D., Yale University
Applied general equilibrium modeling, trade theory, public finance

Kitamura, Yuichi, Associate Professor
Ph.D., Yale University
Theoretical econometrics, time series analysis

Kocherlakota, Narayana, Professor
Ph.D., University of Chicago
Econometrics, applied macroeconomics

Kortum, Sam, Associate Professor
Ph.D., Yale University
Industrial organization, international trade, economic growth

Luttmer, Erzo, Associate Professor
Ph.D., University of Chicago
Financial economics, macroeconomics

McLennan, Andrew, Associate Professor
Ph.D., Princeton University
Game theory, mathematical economics, microeconomics

Mitchell, Matthew, Assistant Professor
Ph.D., University of Rochester
Industrial organization, applied microeconomics

Mohring, Herbert, Professor Emeritus
Ph.D., Massachusetts Institute of Technology
Industrial organization and antitrust, urban economics, resource economics

Moro, Andrea, Assistant Professor
Ph.D., University of Pennsylvania
Public economics, applied microeconomics

Prescott, Edward C., Regents Professor
Ph.D., Carnegie Mellon University
Industrial organization, macroeconomics, organization theory, aggregate fluctuations, growth

Richter, Marcel K., Professor
Ph.D., Massachusetts Institute of Technology
Mathematical economics, rational choice theory, general equilibrium theory

Rustichini, Aldo, Professor
Ph.D., University of Minnesota
Decision theory, microeconomic theory, models of bounded rationality, economic dynamics and microeconomic theory

Ruttan, Vernon, Regents Professor
Ph.D., University of Chicago
Economics of agricultural development, technical change, research policy

Sahi, Simran, Assistant Professor
Ph.D., University of Pittsburgh
International trade and finance

Smith, Harlan, Professor Emeritus
Ph.D., University of Chicago
Economic philosophy, economic problems, world order studies

Swan, Craig, Professor
Ph.D., Yale University
Macroeconomics, econometrics, money, banking, housing policy, mortgage markets

Thomas, Julia, Assistant Professor
Ph.D., University of Virginia
Aggregate implications of discrete individual choices, quantitative macroeconomics, stochastic dynamic general equilibrium models

Werner, Jan, Associate Professor
Ph.D., University of Bonn, West Germany
Microeconomic theory, mathematical economics, general equilibrium, financial markets

■ *English*

Anderson, Chester, Professor Emeritus
Ph.D., Columbia University
Modern literature in English, Irish literature, literary criticism

Augst, Thomas, Assistant Professor
Ph.D., Harvard University
American literature/culture, history and theory of reading

Bales, Kent, Professor
Ph.D., University of California, Berkeley
American literature, romanticism, literature and the other arts

Brennan, Timothy, Assistant Professor
Ph.D., Columbia University
Atlantic cultures, American ethnic literatures, 20th-century literary/cultural theory

*** Bridwell-Bowles, Lillian, Professor**
Ed.D., University of Georgia
Composition research and theory, rhetorical theory, feminist rhetoric

§ Browne, Michael Dennis, Professor
M.A., University of Iowa
Creative writing, modern and contemporary poetry and poetics

***§ Clayton, Thomas, Professor**
D.Phil., Oxford University
Shakespeare, 17th-century English literature, classical literature, literary criticism

Cucullu, Lois, Assistant Professor
Ph.D., Brown University
British modernism, Victorian literature, popular culture and media

Damon, Maria, Associate Professor
Ph.D., Stanford University
Modern poetry, poetics

Elfenbein, Andrew, Associate Professor
Ph.D., Yale University
Romanticism, Victorian literature, intertextuality and influence, gender

Escure, Genevieve, Professor
Ph.D., Indiana University
Sociolinguistics, language universals, linguistic theory, phonology, syntax

Firchow, Peter, Professor
Ph.D., University of Wisconsin
Modern British, American literature; comparative literature; utopian literature

Fitzgerald, M.J., Associate Professor
M.A., York University
Fiction writing, contemporary fiction

Fruman, Norman, Professor Emeritus
Ph.D., New York University
The Romantics, 18th century, literary criticism (antiquity to present)

*** Garner, Shirley, Professor**
Ph.D., Stanford University
Renaissance literature, 16th-century poetry, Shakespeare, autobiography, feminist criticism

§ Geffen, Arthur, Associate Professor Emeritus
Ph.D., University of Chicago
American literature, fiction, poetry, drama, humor, Jewish-American literature

Gonzalez, Ray, Assistant Professor
M.F.A., Southwest Texas State University
Creative writing, Latin American studies, poetry, creative nonfiction

§ Griffin, Edward, Professor
Ph.D., Stanford University
American literature, American studies, American religion, teaching

Haley, David, Professor
Ph.D., Harvard University
Renaissance and Enlightenment poetry, philosophy, drama, politics; the Bible

§ Hampl, Patricia, Professor
M.F.A., University of Iowa
Creative writing, autobiographical writing, contemporary American poetry, fiction

Hancher, Michael, Professor
Ph.D., Yale University
Victorian literature, pragmatics and literature, literary illustration

*** Hirsch, Gordon, Professor**
Ph.D., University of California, Berkeley
Victorian literature, English novel, psychological approaches, critical theory

Ismail, Qadri, Assistant Professor
Ph.D., Yale University
Marxism, nationalism, feminist theory, postcolonial studies, literary theory

*** Kendall, Calvin, Professor**
Ph.D., University of California, Berkeley
Old English literature, Middle English literature, medieval Latin

Lee, Josephine, Assistant Professor
Ph.D., Princeton University
Modern British, American, world drama; performance theory; Asian-American studies

***§ Leyasmeyer, Archibald, Associate Professor**
Ph.D., Princeton University
Drama (especially modern), 18th-century literature, verbal and visual satire

Luke, David, Assistant Professor
Ph.D., State University of New York
Romantic literature (especially Keats), Victorian literature (especially Arnold)

MacLeish, Andrew, Professor Emeritus
Ph.D., University of Wisconsin
Language and linguistics, history of English language, Middle English

***§ McNaron, Toni, Professor**
Ph.D., University of Wisconsin
Shakespeare, Woolf, Dickinson, lesbian poetry, feminist criticism/pedagogy, Milton

Messer-Davidow, Ellen, Associate Professor
Ph.D., University of Cincinnati
Literary/cultural theory, feminist studies, 18th-century literature, academic knowledge-production

Miner, Valerie, Associate Professor
M.J., University of California
Fiction writing, contemporary fiction

Mowitt, John, Associate Professor
Ph.D., University of Wisconsin
Metacriticism, cultural studies and popular practices (film, music, and literature)

Rabinowitz, Paula, Professor
Ph.D., University of Michigan, Ann Arbor
20th-century American writers, women, minorities, Marxist criticism, feminist criticism

Raley, Rita, Assistant Professor
Ph.D., University of California
Hypertext and Internet, postcolonial literature, poststructuralist and postmodernist theory

§ Reed, Peter, Professor
Ph.D., University of Washington
20th-century British novel, poetry, and drama

Ross, Donald, Professor
Ph.D., University of Michigan
American "Renaissance," theory of novel, computers in writing instruction

Roth, Marty, Professor
Ph.D., University of Chicago
19th-century American fiction, popular culture, film, culture and addiction

Scandura, Jani, Assistant Professor
Ph.D., University of Michigan
American, British literature; cultural studies; literary, architectural, feminist theory

Schumacher, Julie, Associate Professor
M.F.A., Cornell University
Fiction writing, contemporary fiction, novels, short stories

Solotaroff, Robert, Professor
Ph.D., University of Chicago
American literature, theory of fiction, modernism

Sprengnether, Madelon, Professor
Ph.D., Yale University
Feminist criticism, Renaissance literature, women writers, creative writing

Stekert, Ellen, Professor
Ph.D., University of Pennsylvania
American folksong, lesbian folklore, "disability" folklore, horror genres

***§ Sugnet, Charles, Associate Professor**
Ph.D., University of Virginia
Shakespeare, novels, feminist criticism, American nature writing, Romantic period

Watkins, John, Associate Professor
Ph.D., Yale University
Medieval and Renaissance literature, poetics

*** Weinsheimer, Joel, Professor**
Ph.D., Ohio University
Late 18th-century literature (especially Johnson, Austen), literary theory

*** Wright, John, Associate Professor**
Ph.D., University of Minnesota
American and Afro-American literature, intellectual history, folklore, orality, sociology of literature

■ *English as a Second Language*

Cohen, Andrew, Professor
Ph.D., Stanford University
Applied linguistics, second-language acquisition

***§ Tarone, Elaine, Professor**
Ph.D., University of Washington
Applied linguistics, second-language acquisition

■ *French and Italian*

Akehurst, F.R.P., Professor
Ph.D., University of Colorado
Old French language, law, and literature

Brewer, Daniel, Associate Professor
Ph.D., Johns Hopkins University
Early modern French literature and culture, literary theory

Brewer, Mária, Associate Professor
Ph.D., Yale University
20th-century literature; theater; literary, cultural theory; gender

Cherbuliez, Juliette, Assistant Professor
Ph.D., University of Pennsylvania, Philadelphia
17th-century literature and culture

Ferlito, Susanna, Associate Professor
Ph.D., University of California, Los Angeles
19th-20th century Italian literature and culture

Kerr, Betsy, Associate Professor
Ph.D., Indiana University
French linguistics, applied linguistics, pragmatics

Martinez, Ronald, Associate Professor
Ph.D., University of California, Santa Cruz
Dante, Renaissance

Noakes, Susan, Professor
Ph.D., Yale University
Late medieval/early Renaissance French and Italian literature

Paganini, Maria, Professor
Ph.D., Zurich University, Switzerland
20th-century novel

Preckshot, Judith, Associate Professor
Ph.D., University of California, Irvine
Francophone and 20th-century literature

Robinson, Peter, Associate Professor
Ph.D., University of Pennsylvania
19th-century poetry

Sivert, Eileen, Associate Professor
Ph.D., University of California, Riverside
19th-century narrative, literature of Quebec, women's studies

Smith, Alan, Assistant Professor
Ph.D., Cornell University
Early modern French and Italian literature

■ *Geography*

Adams, John, S., Professor
Ph.D., University of Minnesota
American cities, regional analysis, Russia and environs

Barrett, Ward, Professor Emeritus
Ph.D., University of California, Berkeley
Middle America, Oceania, historical geography

Borchert, John, Regents Professor Emeritus
Ph.D., University of Wisconsin
Metropolitan and regional land use planning

Braun, Bruce W., Assistant Professor
Ph.D., University of British Columbia
Society-environment relations; political ecology; social, cultural theory

Brown, Dwight, Professor
Ph.D., University of Kansas
Physical geography, cartography, paleoenvironments, water resources, GIS

§ Gersmehl, Philip, Professor
Ph.D., University of Georgia
Physical geography, education, North America, geographic information systems

Hart, John, Professor
Ph.D., Northwestern University
Regional geography, North America

Hsu, Mei Ling, Professor Emeritus
Ph.D., University of Wisconsin
East Asia, cartography (design and automation)

Klink, Katherine, Assistant Professor
Ph.D., University of Delaware
Climate-biosphere interaction, climate dynamics, quantitative methods

Leitner, Helga, Professor
Ph.D., University of Vienna
Urban and regional development, international labor migration, Europe

Lukermann, Fred, Professor Emeritus
Ph.D., University of Minnesota
Historical-geographical thought

McMaster, Robert B., Associate Professor
Ph.D., University of Kansas
Cartography, geographic information systems, quantitative methods, spatial analysis

*** Martin, Judith A., Professor**
Ph.D., University of Minnesota
Urban planning, environmental perception

Mather, Eugene, Professor Emeritus
Ph.D., University of Wisconsin
Rural settlement of the Americas

*** Miller, Roger, Associate Professor**
Ph.D., University of California, Berkeley
Urban and historical geography, geographical methodology and theory

Porter, Philip, Professor
Ph.D., University of London
Cartography, Africa, tropical agriclimatology, development

Rice, John, Professor
Fil. lic., University of Uppsala
Historical geography, Europe (especially Scandinavian states and Finland)

Samatar, Abdi, Associate Professor
Ph.D., University of California, Berkeley
Third World development and regional planning, East Africa

Schwartzberg, Joseph, Professor
Ph.D., University of Wisconsin
South and Southeast Asia, political geography, historical cartography

Scott, Earl, Professor
Ph.D., University of Michigan
Cultural and economic geography, Africa

Sheppard, Eric, Professor
Ph.D., University of Toronto
Economic geography, political economy, quantitative methods, philosophical foundations

Skaggs, Richard, Professor
Ph.D., University of Kansas
Climatology, physical geography, long-term temperature trends, drought

Squires, Roderick, Associate Professor
Ph.D., University of Durham, England
Public land policy

Till, Karen E., Assistant Professor
Ph.D., University of Wisconsin, Madison
Urban, social theory, historic landscapes, Europe, North America

*** Weil, Connie, Associate Professor**
Ph.D., Columbia University
Medical geography, Latin America

■ *German, Scandinavian, and Dutch*

Baker, Eric, Assistant Professor
Ph.D., Johns Hopkins University
German enlightenment to romanticism, aesthetic theory and literature of the sublime and the comic sublime, theory of rhetoric

Duroche, Leonard, Associate Professor
Ph.D., Stanford University
Men's studies, literary theory, phenomenology, children's literature, romanticism

Firchow, Evelyn Scherabon, Professor
Ph.D., Harvard University
Germanic philology and medieval German literature

Fullerton, Gerald Lee, Associate Professor
Ph.D., University of Michigan
German and Germanic linguistics

Grimstad, Kaaren, Associate Professor
Ph.D., Harvard University
Swedish, Old Norse languages/literatures, Icelandic sagas, Scandinavian mythology

Hirschbach, Frank, Professor Emeritus
Ph.D., Yale University
20th-century literature, GDR (German Democratic Republic) area studies and literature

Houe, Poul, Professor
Ph.D., Aarhus University, Denmark
Modern Danish and Swedish literature, European humanism, travel and exile literature

Joeres, Ruth-Ellen Boetcher, Professor
Ph.D., Johns Hopkins University
18th- to 20th-century literature, comparative feminist theories, women's history and literature

Liberman, Anatoly, Professor
Dr. phil., University of Leningrad
General linguistics, Germanic philology, folklore, poetic translation, medieval literature

McBride, Patrizia Carollo, Assistant Professor
Ph.D., Indiana University
20th-century literature, Austrian literature, literature and philosophy

McCormick, Richard, Associate Professor
Ph.D., University of California, Berkeley
Film studies, 20th-century literature and culture, feminism and gender studies

Melin, Charlotte, Assistant Professor
Ph.D., University of Michigan
Postwar German poetry, German-American literary relations, second-language acquisition

Mishler, William, Associate Professor
Ph.D., University of Minnesota
Norwegian language/literature, modern Scandinavian literature and film

Morris, Leslie, Associate Professor
Ph.D., University of Massachusetts, Amherst
20th-century German and Austrian literature, poetry, Jewish studies

Parente, James A., Jr., Professor
Ph.D., Yale University
Medieval and early modern German, Netherlandic and Scandinavian literature and culture

Schulte-Sasse, Jochen, Professor
Dr. phil., Ruhr University, Bochum, Germany
Literature 1700-1820, 1885-present; theory of literature, popular literature

Stockenström, Göran, Professor
Ph.D., Uppsala University, Sweden
Swedish language/literature, modern drama, Scandinavian immigrant culture

Teraoka, Arlene A., Associate Professor
Ph.D., Stanford University
20th-century and minority literature, intellectual history, cultural criticism

Wakefield, Ray, Associate Professor
Ph.D., Indiana University
Second-language acquisition, medieval literature, Dutch

***§ Weiss, Gerhard, Professor Emeritus**
Ph.D., University of Wisconsin, Madison
17th-, 19th-, and 20th-century literature, German studies

Zagar, Monika, Associate Professor
Ph.D., University of California, Berkeley
Norwegian language and literature, modernism, Scandinavian women writers

Zipes, Jack, Professor
Ph.D., Columbia University
Fairy tales, 20th-century literature; German, women's and Jewish studies

■ *Global Studies*

Berdahl, Daphne, Associate Professor
Ph.D., University of Chicago
Anthropology, sociocultural anthropology, identity, consumption, memory, gender, Europe

Craddock, Susan, Assistant Professor
Ph.D., University of California, Berkeley
Women's studies, geography, critical health geography, political ecologies of disease, medical practices in global perspective

Gidwani, Vinay, Assistant Professor
Ph.D., University of California, Berkeley
Geography, labor geographies, agrarian change, nature/society, political economy of development, India

Jeganathan, Pradeep, Assistant Professor
Ph.D., University of Chicago
Anthropology, sociocultural anthropology, violence

Kaminsky, Amy, Professor
Ph.D., Pennsylvania State University
Women's studies, feminist theory, Latin American literature, gender and nation

Leitner, Helga, Professor
Ph.D., University of Vienna
Geography, urban and regional development, international labor migration, Europe

Skaria, Ajay, Associate Professor
Ph.D., Trinity College and Gonville and Caius College, Cambridge, U.K.
History, colonialism, nationalism, South Asia

Wolfe, Thomas, Assistant Professor
Ph.D., University of Michigan
History, anthropology, Europe/Soviet Union/Russia, 20th century, media, communications, culture

■ *History*

Altholz, Josef, Professor
Ph.D., Columbia University
Modern English history, religious history of modern Europe

Bachrach, Bernard, Professor
Ph.D., University of California, Berkeley
Europe before 1200, medieval military history

Bamford, Paul, Professor Emeritus
Ph.D., Columbia University
Oceanic history, expansion of Europe

Berman, Hyman, Professor
Ph.D., Columbia University
American labor and radicalism, 20th century, Minnesota history

Brauer, Kinley, Professor Emeritus
Ph.D., University of California, Berkeley
U.S. foreign relations

*** Chambers, Clarke, Professor Emeritus**
Ph.D., University of California, Berkeley
American social history, social welfare history

Chambers, Sarah, Associate Professor
Ph.D., University of Wisconsin, Madison
Colonial Latin America, women

Clark, Anna, Professor
Ph.D., Rutgers University
Modern European history, British/Irish history, women's history, history of sexuality

Cohen, Gary B., Professor
Ph.D., Princeton University
Austrian studies, Eastern Europe, modern European social history

Evans, John, Professor
Ph.D., McMaster University, Canada
Roman history

Evans, Sara, Professor
Ph.D., University of North Carolina, Chapel Hill
American women's history, family history, social movements

Farah, Caesar, Professor
Ph.D., Princeton University
Modern Near East, Arabic, Islamic history

*** Farmer, Edward, Professor**
Ph.D., Harvard University
Modern Chinese history, comparative early modern history,

Fischer, Kirsten, Assistant Professor
Ph.D., Duke University
Colonial/revolutionary America, U.S. social and intellectual history

Good, David F., Professor and Chair
Ph.D., University of Pennsylvania
European economic history, Hapsburg Empire

*** Green, George, Associate Professor**
Ph.D., Stanford University
American economic and business history, historiography, historical methods

Howe, John, Professor Emeritus
Ph.D., Yale University
18th- and 19th-century American political history

§ Isaacman, Allen, Regents Professor
Ph.D., University of Wisconsin
Southern Africa, peasant studies, historical methodology

Isett, Christopher, Assistant Professor
Ph.D., University of Los Angeles
Modern Chinese social, economic history

Lower, Michael, Assistant Professor
Ph.D., Cambridge University
Medieval Europe, the crusades, popular religion, the papacy

Karras, Ruth, Professor
Ph.D., Yale University
Medieval history, early modern Britain, Viking age

Kelly, Thomas, Professor Emeritus
Ph.D., University of Illinois
Ancient Greece

*** Kieft, David, Associate Professor Emeritus**
Ph.D., University of California, Berkeley
European diplomatic history, German history

Kopf, David, Professor Emeritus
Ph.D., University of Chicago
South and Southeast Asian cultural history, comparative world history

Lee, Erika, Assistant Professor
Ph.D., University of California, Berkeley
20th-century United States, Asian-American history, immigration history

§ Lehmberg, Stanford, Professor Emeritus
Ph.D., Cambridge University
Tudor-Stuart England

Marshall, Byron K., Professor Emeritus
Ph.D., Stanford University
Asian history, 19th- and 20th-century Japanese history

***§ May, Elaine Tyler, Professor**
Ph.D., University of California, Los Angeles
American history, American studies, women

*** May, Lary, Professor**
Ph.D., University of California, Los Angeles
American history, American studies

Maynes, Mary Jo, Professor
Ph.D., University of Michigan
Modern European social history, family, women, education, Germany

McCaa, Robert, Professor
Ph.D., University of California, Los Angeles
Modern Latin America, demographic history, quantitative methods

McNamara, Patrick, Assistant Professor
Ph.D., University of Wisconsin, Madison
Colonial/modern Latin America, history of Mexico

Menard, Russell, Professor
Ph.D., University of Iowa
Early American history

Mizuno, Hiromi, Assistant Professor
Ph.D., University of California, Los Angeles
Modern Japan, gender, cultural science and technology

§ Munholland, Kim, Professor
Ph.D., Princeton University
Contemporary French social and political history, French imperialism

Norling, Lisa, Associate Professor
Ph.D., Rutgers University
American social and cultural history, gender, maritime history

O'Brien-Kehoe, Jean M., Associate Professor
Ph.D., University of Chicago
Indians of the Northeast (17th and 18th centuries), colonial America

Phillips, Carla Rahn, Professor
Ph.D., New York University
Early modern Europe (1450–1750), economy and society, Spain

Phillips, William, Professor
Ph.D., New York University
Medieval and early modern Europe, Spain, European expansion

Reyerson, Kathryn, Professor
Ph.D., Yale University; Doctorat d'Etat, Montpellier Law School
Medieval Europe, social, economic, and legal history, France

Rudolph, Richard, Professor Emeritus
Ph.D., University of Wisconsin
Russia, central and Eastern Europe

Ruggles, Steven, Professor
Ph.D., University of Pennsylvania
Historical demography, history of family, U.S. social history

§ Samaha, Joel, Professor
Ph.D., Northwestern University
Criminal justice history, criminal law and criminal procedure

Shank, J. B., Assistant Professor
Ph.D., Stanford University
Early modern Europe, France, European intellectual history of science

Skaria, Ajay, Associate Professor
Ph.D., Trinity College, University of Cambridge
19th and 20th-century South Asian history, environmental history

Spear, Allan, Associate Professor Emeritus
Ph.D., Yale University
20th-century U.S. history

§ Stavrou, Theofanis, Professor
Ph.D., Indiana University
Russia, modern Greece, Eastern Orthodoxy

Taylor, Romeyn, Professor Emeritus
Ph.D., University of Chicago
History of Chinese society, late imperial Chinese history

Thayer, John, Professor
Ph.D., University of Wisconsin
Modern European political-cultural history, historiography and method

Tracy, James, Professor
Ph.D., Princeton University
Early modern Europe, 16th century, the Low Countries

Vecoli, Rudolph, Professor
Ph.D., University of Wisconsin, Madison
History of American immigration, ethnicity and pluralism

Wagner, Michele, Assistant Professor
Ph.D., University of Wisconsin, Madison
African history, Great Lakes Africa, East Africa, human rights, oral history

Waltner, Ann, Professor
Ph.D., University of California, Berkeley
Chinese social history, religion, gender, fiction, ritual, law

Wang, Liping, Associate Professor
Ph.D., University of California, San Diego
Social and cultural history of nationalist/communist period in modern China

Weitz, Eric, Associate Professor
Ph.D., Boston University
Early modern and modern Germany, social/intellectual history, modern Russia/Soviet Union

Welke, Barbara, Assistant Professor
Ph.D., University of Chicago
19th- and 20th-century U.S. legal, constitutional, and women's history

Wolfe, Thomas, Assistant Professor
Ph.D., University of Michigan
Contemporary Russia, history of media, modernity/postmodernity, anthropology of complex societies

Wright, William, Professor Emeritus
Ph.D., University of Colorado
Austrian history

■ *Humanities*

Kliger, George, Assistant Professor
Ph.D., University of Minnesota
Modern European philosophy, psychology, literature, art; pre-Muslim India

■ *Journalism and Mass Communication*

Babcock, William, Associate Professor
Ph.D., Southern Illinois University
News-editorial, international communication, media ethics, environmental communication

Carter, Roy, Professor Emeritus
Ph.D., Stanford University
International mass communication, theory and methodology

Chang, Tsan-Kuo, Associate Professor
Ph.D., University of Texas at Austin
International communication, theory and methodology, mass communication diplomacy

Dicken-Garcia, Hazel, Professor
Ph.D., University of Wisconsin, Madison
Mass communication history, news-editorial

Doyle, Kenneth, Associate Professor
Ph.D., University of Minnesota
Quantitative and qualitative research methodology, financial psychology, cross-cultural studies

Faber, Ronald, Professor
Ph.D., University of Wisconsin, Madison
Advertising, mass media effects, political communication

Fang, Irving, Professor
Ph.D., University of California, Los Angeles
Broadcast journalism, communication technology, history of photography, motion pictures

Gerald, J. Edward, Professor Emeritus
Ph.D., University of Minnesota
Media law

*** Gillmor, Donald, Professor Emeritus**
Ph.D., University of Minnesota
Media and constitutional law, communication agencies as social institutions

Hansen, Kathleen, Associate Professor
M.A., M.L.S., University of Wisconsin, Madison
Information access/communication, sociology of news, bibliographic retrieval

Jones, Robert, Professor Emeritus
Ph.D., University of Minnesota
Advertising

Kirtley, Jane, Professor
J. D., Vanderbilt University
Media law and ethics, international communication, constitutional and administrative law

Lee, Chin Chuan, Professor
Ph.D., University of Michigan
International mass communication, theory and methodology, political communication

Roberts, Nancy, Professor
Ph.D., University of Minnesota
Communication history, magazine writing, literary aspects of journalism

Schwartz, Dona, Associate Professor
Ph.D., University of Pennsylvania
Visual communication, photography, qualitative approaches to mass communication

Sullivan, Dan, Professor
Ph.D., Yale University
Media strategy, future of media, new media

Tichenor, Phillip, Professor Emeritus
Ph.D., Stanford University
Theory and methodology, science journalism, public opinion

Tims, Albert, Associate Professor and Director
Ph.D., University of Wisconsin, Madison
Communication theory/methodology, public opinion and political communication

Wackman, Daniel, Professor
Ph.D., University of Wisconsin, Madison
Media management, advertising, theory and methodology

***Ward, Jean, Professor Emeritus**
Ph.D., University of Minnesota
Sociology of news, neighborhood press, language and communication

Wells, William, Professor
Ph.D., Stanford University
Advertising/marketing, information management, statistics, consumer behavior/attitudes

■ *Linguistics*

Downing, Bruce, Associate Professor
Ph.D., University of Texas
Syntax, English linguistics, bilingualism

Gundel, Jeanette, Professor
Ph.D., University of Texas
Syntax, semantics, pragmatics, discourse analysis, language processing

Stenson, Nancy, Associate Professor
Ph.D., University of California, San Diego
Syntax; Irish, Celtic, and American Indian languages, applied linguistics

■ *Music*

Anderson, John, Professor
Ed.D., Columbia University
Woodwind coordinator, clarinet, pedagogy and literature, woodwind ensembles

Argento, Dominick, Regents Professor Emeritus
Ph.D., Eastman School of Music
Composition, orchestration

Artymiw, Lydia, Professor
B.A., Philadelphia College of Performing Arts
Piano

Ashworth, Thomas, Associate Professor
M.M., North Texas State University
Trombone, euphonium

Baldwin, David, Professor
D.M.A., Yale University
Brass coordinator, trumpet, trumpet pedagogy, transcription for winds

Billmeyer, Dean, Associate Professor
D.M.A., Eastman School of Music
Organ literature and pedagogy, church music, advanced keyboard harmony

Bjork, Mark, Associate Professor
B.M., Indiana University
Violin, Suzuki pedagogy

Braginsky, Alex, Professor
D.M.A. (equiv.), Moscow Conservatory
Piano, chamber music

Cherlin, Michael, Associate Professor
Ph.D., Yale University
Tonal and posttonal theory, analysis; text and music

Damschroder, David, Associate Professor
Ph.D., Yale University
Tonal theory and analysis, history of music theory

del Santo, Jean, Associate Professor
M.M., Indiana University
Voice (soprano), vocal literature, diction

Furman, Charles, Associate Professor
Ph.D., Florida State University
Music therapy, music education, psychology of music

Garrett, Margo, Professor and Ethel Hitchcock Endowed Chair in Accompanying and Coaching
M.M., Manhattan School of Music
Accompanying and coaching

Grayson, David, Professor
Ph.D., Harvard University
Historical musicology, 19th-20th centuries, Debussy studies

Haack, Paul, Professor
Ph.D., University of Wisconsin
Music education

Harness, Kelley, Assistant Professor
Ph.D., University of Illinois, Urbana-Champaign
Musicology

Jackson, Donna, Professor
Ph.D., Harvard University
Historical musicology, medieval and Renaissance

Kagan, Alan, Associate Professor Emeritus
Ph.D., Indiana University
Ethnomusicology of China and Asia, American fiddle, video documentation

Kim, Young Nam, Associate Professor
M.M., Syracuse University
Violin, chamber music, string orchestra

Kirchhoff, Craig, Professor
M.M., University of Wisconsin
Director of bands, conducting

Konkol, Korey, Professor
M.M., New England Conservatory
Viola

Lancaster, Thomas, Professor
D.M., Indiana University
Choral conducting

***Lubet, Alex, Professor**
Ph.D., University of Iowa
Composition, 20th-century theory, theory pedagogy

Maurice, Glenda, Professor
M.M., Manhattan School of Music
Voice (mezzo-soprano), vocal literature

McCoy, Claire, Professor
Ph.D., University of Iowa
Music education, movement-based methods

McCurdy, Ronald, Professor
Ph.D., University of Kansas
Jazz ensemble, vocal jazz, jazz improvisation, Afro-American studies

Meza, Fernando, Associate Professor
M.M., University of Michigan
Percussion, percussion literature/techniques/pedagogy

O'Reilly, Sally, Professor
M.M., Indiana University
Violin

Paulnack, Karl, Assistant Professor
D.M.A., University of Southern California
Accompanying

Remenikova, Tanya, Professor
D.M.A. (equiv.), Moscow Conservatory
Cello, cello pedagogy, string techniques, chamber ensembles

Romey, Kathy Saltzman, Lecturer
D.M.A. (equiv.), Hochschule für Musik (Frankfurt, Germany)
Choral music

Shaw, Paul, Associate Professor
D.M.A., The Julliard School
Piano

Shockley, Rebecca, Associate Professor
D.M.A., University of Colorado
Piano, class piano, pedagogy, piano ensembles

***Sutton, Everett, Professor**
Ph.D., University of Minnesota
Opera theater/workshop

Ware, D. Clifton, Professor
D.M., Northwestern University
Voice (tenor), pedagogy

Weller, Lawrence, Associate Professor
M.M., University of Illinois
Voice (baritone), diction, vocal literature

Zaimont, Judith, Professor
M.A., Columbia University
Composition, theory

■ *Philosophy*

Bowie, Norman E., Professor
Ph.D., University of Rochester
Political philosophy, corporate responsibility, ethics

Dahl, Norman, Professor
Ph.D., University of California, Berkeley
Moral philosophy, ancient philosophy

***Dolan, John M., Associate Professor**
Ph.D., Stanford University
Philosophy of language, epistemology, medical ethics

Eaton, Marcia M., Professor
Ph.D., Stanford University
Aesthetics

Giere, Ronald, Professor
Ph.D., Cornell University
Philosophy of science

Gunderson, Keith, Professor
Ph.D., Princeton University
Philosophy of mind, aesthetics, 17th- and 18th-century philosophy

***Hanson, William, Professor**
Ph.D., Yale University
Logic, philosophy of logic

Hellman, Geoffrey, Professor
Ph.D., Harvard University
Philosophy of natural science, mathematics and logic, aesthetics

Holtman, Sarah, Assistant Professor
Ph.D., University of North Carolina
Ethics, political philosophy, philosophy of law

Hopkins, Jasper, Professor
Ph.D., Harvard University
Ancient and medieval philosophy, philosophy of religion

Kac, Michael, Professor
Ph.D., University of California, Los Angeles
Philosophy of language, formal theories of language

§ Lewis, Douglas, Professor
Ph.D., University of Iowa
17th- and 18th-century philosophy, metaphysics

Longino, Helen, Professor
Ph.D., Johns Hopkins University
Feminist theories of knowledge, philosophy of science, social epistemology

Mason, H. E., Professor
Ph.D., Harvard University
Moral and political philosophy, philosophy of language

§Owens, Joseph, Professor
Ph.D., University of California, Los Angeles
Philosophy of mind, language, metaphysics

§ Peterson, Sandra, Professor
Ph.D., Princeton University
Ancient philosophy, moral philosophy

§ Root, Michael, Associate Professor
Ph.D., University of Illinois
Philosophy of language, philosophy of social science

Savage, C. Wade, Professor
Ph.D., Cornell University
Philosophy of science, epistemology, philosophy of psychology

§ Scheman, Naomi, Professor
Ph.D., Harvard University
Feminist theory, epistemology, Wittgenstein

Tiberius, Valerie, Assistant Professor
Ph.D., University of North Carolina at Chapel Hill
Moral philosophy, metaethics, practical reason

§Wallace, John, Professor
Ph.D., Stanford University
Philosophy of language

Waters, C. Kenneth, Associate Professor
Ph.D., Indiana University
Philosophy of science, epistemology, philosophy of biology

■ *Political Science*

Abernathy, Scott, Assistant Professor
Ph.D., Princeton University
American politics, education policy

§ Dietz, Mary, Professor
Ph.D., University of California, Berkeley
Development of political thought

Disch, Lisa, Associate Professor
Ph.D., Rutgers University
Political theory

Druckman, James, Assistant Professor
Ph.D., University of California, San Diego
American politics, political behavior

***§ Duvall, Raymond, Professor**
Ph.D., Northwestern University
International relations, comparative political economy

***§ Farr, James, Professor**
Ph.D., University of Minnesota
Political theory

Federico, Christopher, Assistant Professor
Ph.D., University of California, Los Angeles
Political psychology

Flanigan, William, Professor
Ph.D., Yale University
Political behavior, American politics

Fogelman, Edwin, Professor
Ph.D., Princeton University
Political theory

***§ Freeman, John, Distinguished McKnight University Professor**
Ph.D., University of Minnesota
Political economy, methodology

Jacobs, Lawrence, Professor
Ph.D., Columbia University
American public policy, American politics

Johnson, Timothy, Assistant Professor
Ph.D., Washington University
American politics, judicial process

Kahl, Colin, Assistant Professor
Ph.D., Columbia University
International relations

Kapstein, Ethan, Professor
Ph.D., Harvard University
Political economy, international relations

***§ Kelliher, Daniel, Associate Professor**
Ph.D., Yale University
Comparative politics, China

Kvavik, Robert, Professor
Ph.D., Stanford University
Political organizations, Scandinavia

Lomonaco, Jeffrey, Assistant Professor
Ph.D., Johns Hopkins University
Political theory

Luks, Samantha, Assistant Professor
Ph.D., University of California, Berkeley
American politics, political behavior, methodology

Miller, Joanne, Assistant Professor
Ph.D., Ohio State University
Political psychology

§ Nimtz, August, Professor
Ph.D., Indiana University
Africa, comparative and community politics

Rahn, Wendy, Associate Professor
Ph.D., University of Minnesota
American politics, political psychology

Richards, Diana, Associate Professor
Ph.D., Yale University
Methodology, international relations

Rosenstone, Steven, Professor
Ph.D., University of California, Berkeley
American politics, methodology

*** Sampson, Martin, Associate Professor**
Ph.D., Indiana University
International relations, foreign policy

Samuels, David, Assistant Professor
Ph.D., University of California, San Diego
Comparative politics, Latin American politics

Scott, Thomas, Professor
Ph.D., Northwestern University
Urban government and politics, American politics

*** Shively, W. Phillips, Professor**
Ph.D., University of North Carolina
Comparative politics, Western Europe

Sikkink, Kathryn, Arleen Carlson Professor
Ph.D., Columbia University
Comparative politics, Latin America

Silverstein, Gordon, Assistant Professor
Ph.D., Harvard University
Constitutional law, American politics

*** Strolovitch, Dara, Assistant Professor**
Ph.D., Yale University
American politics

*** Sullivan, John, Regents Professor and Arleen Carlson Professor**
Ph.D., University of North Carolina
Methodology, political psychology

■ *Psychology*

Berscheid, Ellen, Regents Professor
Ph.D., University of Minnesota
Interpersonal attraction, close relationships, emotion, social perception/cognition

Bono, Joyce E., Assistant Professor
Ph.D., University of Iowa
Leadership, personality, emotions, motivation

***§ Borgida, Eugene, Professor**
Ph.D., University of Michigan
Social cognition, attitude theory, psychology and law, psychology and politics

Bouchard, Thomas, Professor
Ph.D., University of California, Berkeley
Twins, adoptees, mental ability, behavior genetics, personality interests

Burkhardt, Dwight, Professor
Ph.D., Brown University
Sensory psychobiology: vision, retinal neuron function, human psychophysics

Butcher, James, Professor
Ph.D., University of North Carolina
Personality assessment, cross-cultural psychology

Campbell, John, Professor
Ph.D., University of Minnesota
Personnel selection, performance modeling and assessment, occupational structures

Cudeck, Robert, Professor
Ph.D., University of Southern California
Quantitative psychology

Dawis, René, Professor Emeritus
Ph.D., University of Minnesota
Vocational psychology, individual differences, psychological measurement, industrial/organizational psychology

Dunnette, Marvin, Professor Emeritus
Ph.D., University of Minnesota
Personnel selection, performance appraisal, task and job analysis

Federico, Christopher, Assistant Professor
Ph.D., University of California, Los Angeles
Political psychology, intergroup relations, and racial attitudes; psychology of legitimacy; political enterprise

Fletcher, Charles, Associate Professor
Ph.D., University of Colorado, Boulder
Cognitive science, discourse comprehension, memory

Fox, Paul, Professor Emeritus
Ph.D., Tulane University
Human learning and memory, cognition, psychology of instruction

Frazier, Patricia, Associate Professor
Ph.D., University of Minnesota
Counseling and social psychology, coping with stressful life events

Garmezy, Norman, Professor Emeritus
Ph.D., Iowa State University
Clinical psychology, personality, developmental psychopathology, childhood stressors, resistance and resilience

Gewirtz, Jonathon, Assistant Professor
Ph.D., Yale University
Biological bases of learning, memory, mental illness, and the startle reflex

***§ Gonzales, Marti, Associate Professor**
Ph.D., University of California, Santa Cruz
Accountability, applied social psychology, impression management, interpersonal conflict, political socialization

Grove, William, Associate Professor
Ph.D., University of Minnesota
Mood disorders, schizophrenia, behavior genetics, assessment, classification methodology

Hansen, Jo-Ida, Professor
Ph.D., University of Minnesota
Vocational interest measurement, inventory construction, career development, vocational psychology

He, Sheng, Assistant Professor
Ph.D., University of California, San Diego
Human vision and attention, visual awareness, cognitive neuroscience

Iacono, William, Professor
Ph.D., University of Minnesota
Schizophrenia, substance abuse, psychophysiology, detection of deception

Kersten, Daniel, Professor
Ph.D., University of Minnesota
Perception, computational vision, neural networks, brain imaging

Krueger, Robert, Assistant Professor
Ph.D., University of Wisconsin, Madison
Clinical, personality, individual differences, assessment, behavior genetics

Lee, Richard, Assistant Professor
Ph.D., Virginia Commonwealth University
Ethnic minority mental health and counseling, ethnic identity and family, personality and adjustment

Legge, Gordon, Professor
Ph.D., Harvard University
Visual perception

Leon, Gloria, Professor
Ph.D., University of Maryland
Stress and coping in extreme situations, eating disorders

Luciana, Monica, Assistant Professor
Ph.D., University of Minnesota
Neurotransmitters and behavior, prefrontal development, neuropsychology, biology and psychopathology

Lykken, David, Professor Emeritus
Ph.D., University of Minnesota
Personality, psychophysiology, behavior genetics, forensic psychology

Marsolek, Chad, Associate Professor
Ph.D., Harvard University
Human memory, vision, and learning; cognitive neuroscience

McGue, Matthew, Professor
Ph.D., University of Minnesota
Behavior genetics, individual differences, substance abuse, aging

Meehl, Paul, Regents Professor Emeritus
Ph.D., University of Minnesota
Clinical, psychometric methods, forensics, taxometrics, philosophy

Motowidlo, Stephan, Professor
Ph.D., University of Minnesota
Job performance, personnel research, organizational behavior

Oishi, Shigehiro, Assistant Professor
Ph.D., University of Illinois, Urbana-Champaign
Personality-social psychology, individual and cultural differences in well-being

Ones, Deniz, Assistant Professor
Ph.D., University of Iowa
Ability and personality assessment, personnel selection and classification

Overmier, J. Bruce, Professor
Ph.D., University of Pennsylvania
Learning, memory, stress and its psychosomatic consequences

Patrick, Christopher, Professor
Ph.D., University of British Columbia
Emotion, psychopathy and criminal behavior, substance abuse, psychophysiology

§ Peterson, Gail, Associate Professor
Ph.D., Indiana University
Behavior change—basic theory and applications

Rothman, Alexander, Assistant Professor
Ph.D., Yale University
Social cognition, health beliefs and behavior, persuasion, stereotyping

Sackett, Paul, Professor
Ph.D., Ohio State University
Personnel selection, employment testing, workplace deviance, performance measurement

Schrater, Paul, Assistant Professor
Ph.D., University of Pennsylvania
Computational cognitive science, human and computer vision and motor control, statistical pattern recognition

Snyder, Mark, Professor
Ph.D., Stanford University
Social perception and interpersonal behavior, personality and social interaction

Tellegen, Auke, Professor Emeritus
Ph.D., University of Minnesota
Personality assessment and research, clinical psychology

Viemeister, Neal, Professor
Ph.D., Indiana University
Auditory perception, psychophysics, models of perceptual processes

Weiss, David, Professor
Ph.D., University of Minnesota
Psychometric methods, computerized adaptive testing, item response theory

■ *Slavic and Central Asian Languages and Literatures*

§ Bashiri, Iraj, Professor
Ph.D., University of Michigan
Iranian linguistics and literature, Central Asian studies

Corten, Irina, Associate Professor
Ph.D., University of California, Berkeley
Modern Russian and Soviet literature, Soviet culture, Russian

Jahn, Gary, Professor
Ph.D., University of Wisconsin
19th-century Russian literature, Tolstoy

***§ Polakiewicz, Leonard, Associate Professor**
Ph.D., University of Wisconsin
19th-century Russian literature, Chekhov, Polish language and literature

■ *Sociology*

§ Aminzade, Ronald, Professor
Ph.D., University of Michigan
Social movements, democratic theory, sociology of higher education, development, race relations

Anderson, Ronald, Professor
Ph.D., Stanford University
Methodology, technology, education, gender, organizations, computer simulations

Boyle, Elizabeth, Associate Professor
Ph.D., Stanford University
Law, crime, deviance, gender, comparative and political sociology

Broadbent, Jeffrey, Associate Professor
Ph.D., Harvard University
Social movements, environmental sociology, social network analysis, Japan, East Asia

Donohue, George, Professor Emeritus
Ph.D., Washington State University
Rural sociology, theory

Eliason, Scott, Assistant Professor
Ph.D., Pennsylvania State University

Ellenbogen, B. L., Professor Emeritus
Ph.D., University of Wisconsin
Social organization, developmental change, Latin America

Fulton, Robert, Professor Emeritus
Ph.D., Wayne State University
Sociology of death, AIDS, social stratification

Gerteis, Joseph, Assistant Professor
Ph.D., University of North Carolina, Chapel Hill
Historical and comparative, social movements, class and race, identity, social theory

Hartmann, Douglas, Assistant Professor
Ph.D., University of California, San Diego
Race/ethnicity, cultural sociology, social change, American society, field methods

Hironaka, Ann, Assistant Professor
Ph.D., Stanford University
Political sociology, comparative historical sociology

Hull, Kathleen, Assistant Professor
Ph.D., Northwestern University
Culture, law, social movements, family, gender and sexuality

Johnson, Arthur, Professor Emeritus
Ph.D., University of Minnesota
Religion, applied sociology/evaluation research

Kelly, Erin, Assistant Professor
Ph.D., Princeton University
Organization and work, gender, family, political sociology

Kennedy, Robert, Associate Professor Emeritus
Ph.D., University of California, Berkeley
Demography, medical sociology

Knoke, David, Professor
Ph.D., University of Michigan
Organizations and work, social networks, methods and statistics

Kruttschnitt, Candace, Professor
Ph.D., Yale University
Law and criminology and deviance, gender, life course

Laslett, Barbara, Professor Emeritus
Ph.D., University of Chicago
Historical sociology, family, gender, sociology of knowledge, social theory

Leik, Robert, Professor Emeritus
Ph.D., University of Wisconsin, Madison
Mathematical models, methods and statistics, family, social psychology, Nordic health care

Lutfey, Karen, Assistant Professor
Ph.D., Indiana University
Medical sociology, social psychology, deviance, mental health, qualitative methods

Macmillian, I. Ross, Assistant Professor
Ph.D., University of Toronto
Law and crime and deviance, life course, methodology and statistics, social stratification

Malmquist, Carl, Professor
M.D., University of Minnesota
Juvenile justice, homicide, adolescence, law, mental health system

Mortimer, Jeylan, Professor
Ph.D., University of Michigan
Life course, social psychology of work, adolescent development

Nelson, Joel, Professor
Ph.D., Yale University
Social stratification, comparative community organization

Reiss, Ira L., Professor Emeritus
Ph.D., Pennsylvania State University
Human sexuality, gender roles, family, theory construction

Savelsberg, Joachim, Associate Professor
Dr. rer. pol., University of Trier, Germany
Sociology of law, criminology, theory, comparative

Schofer, Evan, Assistant Professor
Ph.D., Stanford University
Comparative historical sociology, quantitative methods and statistics

Spitzer, Stephan, Associate Professor Emeritus
Ph.D., University of Washington
Social psychology, visual sociology, microcomputing

Robin Stryker, Professor
Ph.D., University of Wisconsin

Uggen, Christopher, Associate Professor
Ph.D., University of Wisconsin
Crime and law and deviance, work, life course, methods and statistics

Ward, David, Professor Emeritus
Ph.D., University of Illinois
Criminology, penology

■ *Spanish and Portuguese Studies*

Arenas, Fernando, Associate Professor
Ph.D., University of California, Berkeley
Luso-Afro-Brazilian studies, critical theory

Egea, Alberto, Assistant Professor
Ph.D., Emory University
Modern Spanish literature and culture, literary theory

Face, Timothy, Assistant Professor
Ph.D., Ohio State University
Hispanic linguistics, phonology and phonetics

Ferrán, Ofelia, Assistant Professor
Ph.D., Cornell University
Modern peninsular literature and literary theory

Jara, René, Professor
Ph.D., Arizona State University
Spanish-American literature: narrative, poetry, essay, literary theory, semiotics

Klee, Carol, Associate Professor
Ph.D., University of Texas, Austin
Hispanic linguistics, applied linguistics and sociolinguistics

Machín, Horacio, Assistant Professor
Ph.D., Stanford University
Contemporary Latin American literature, cultural criticism, cultural studies

O'Connell, Joanna, Associate Professor
Ph.D., University of California, Berkeley
Spanish-American literature: Mexico, Caribbean, Central America; feminism

Ocampo, Francisco, Associate Professor
Ph.D., University of Southern California
Hispanic linguistics, syntax and pragmatics

Oliver, Elide, Assistant Professor
Ph.D., University of São Paulo
Portuguese and Brazilian literature, Brazilian studies, comparative literature

Ramos-Garcia, Luis, Assistant Professor
Ph.D., University of Texas at Austin
U.S. Latino/Latin American theater, literature, cultural studies

Ramos-Gascon, Antonio, Professor
Ph.D., University of California, San Diego
Spanish literature: 18th-20th-century prose and poetry

Spadaccini, Nicholas, Professor
Ph.D., New York University
Spanish Golden Age/colonial literature and culture, comparative literature

Sullivan, Constance, Associate Professor
Ph.D., University of Illinois
18th-20th-century Spanish literature, Spanish feminism

Vidal, Hernan, Professor
Ph.D., University of Iowa
Latin American literature and cultural studies

Weissberger, Barbara, Associate Professor
Ph.D., Harvard University
Medieval and early modern literature

Zahareas, Anthony, Professor Emeritus
Ph.D., Ohio State University
History of Spanish literature: early to modern times

■ *Statistics*

Bingham, Christopher, Professor
Ph.D., Yale University
Directional data analysis, time series analysis, chronobiometry

Chaloner, Kathryn, Professor
Ph.D., Carnegie Mellon University
Bayesian statistics, optimal design, clinical trials, AIDS research

Cook, R. Dennis, Professor
Ph.D., Kansas State University
Linear and nonlinear models, regression diagnostics, graphical methods

Dickey, James, Professor
Ph.D., University of Michigan
Bayesian statistics, expert opinion modeling, smoothing analysis, foundations of inference

Eaton, Morris, Professor
Ph.D., Stanford University
Multivariate analysis, probability inequalities, decision theory, Bayesian analysis

Jones, Galin, Assistant Professor
Ph.D., University of Florida
Convergence of Markov chains, generalized linear mixed models

Geisser, Seymour, Professor
Ph.D., University of North Carolina
Bayesian inference, model selection, predictivism, sample reuse, diagnostics

Geyer, Charles, Professor
Ph.D., University of Washington
Markov chain Monte Carlo, constrained maximum likelihood, statistical genetics

Grund, Birgit, Associate Professor
Ph.D., Humboldt-Universität, Berlin
Curve estimation, kernel smoothing, AIDS research

Hawkins, Douglas, Professor
Ph.D., University of the Witwatersrand, Johannesburg, South Africa
Quality improvement, case diagnostics, geostatistics

Jiang, Tiefeng, Assistant Professor
Ph.D., Stanford University
Mathematical biology, pattern recognition, large deviations, Chen-Stein method

Larntz, Kinley, Professor Emeritus
Ph.D., University of Chicago
Categorical data, experimental design, computer methods, medical applications

Lindgren, Bernard, Professor Emeritus
Ph.D., University of Minnesota
Statistical education, general theory

Martin, Frank, Associate Professor
Ph.D., Iowa State University
Experimental design, analysis of variance procedures, population sampling

Meeden, Glen, Professor
Ph.D., University of Illinois
Decision theory, Bayesian inference, finite population sampling

Oehlert, Gary, Professor
Ph.D., Yale University
Data analysis, environmental trend analysis, nonparametric regression

Qiu, Peihua, Assistant Professor
Ph.D., University of Wisconsin, Madison
Nonparametric regression, curve/surface fitting, image processing, calibration

Sudderth, William, Professor
Ph.D., University of California, Berkeley
Probability theory, stochastic games, foundations of statistics

Tierney, Luke, Professor
Ph.D., Cornell University
Reliability, approximate Bayesian inference, statistical computing, dynamic graphics

Weisberg, Sanford, Professor
Ph.D., Harvard University
Regression and modeling, diagnostics, graphical methods, computing

■ *Theatre Arts and Dance*

Bellamy, Louis, Associate Professor
M.A., University of Minnesota
Directing, acting

Brockman, C. Lance, Professor
M.S., Kansas State Teachers College
Scene design, scene painting

Chatterjea, Ananya, Assistant Professor
Ed.D., Temple University
Dance history and theory

Cheng, Maria, Associate Professor
B.A., University of Minnesota
Modern dance, choreography theory

Gwinup, Martin, Associate Professor
M.F.A., Yale University
Technical production, digital audio, computer control and visual systems

Kanee, Stephen, Associate Professor
M.F.A., University of Minnesota
Directing, acting

Knourek, Pamela, Teaching Specialist
M.F.A., North Carolina School for the Arts
Costume technology

Kobialka, Michal, Associate Professor
Ph.D., City University of New York
Theatre history/theory; medieval, avant-garde, postmodern theatre, historiography

Kuftinec, Sonja, Assistant Professor
Ph.D., Stanford University
Theatre history, performance art and theory, American theatre

LeFebvre, Matthew, Assistant Professor
M.F.A., University of Minnesota
Costume design, drawing and rendering

Maddux, Margaret L., Associate Professor
M.A., Sarah Lawrence College
Modern dance, choreography, ethnic and theory

Montgomery, Jean, Associate Professor
M.F.A., University of Minnesota
Lighting design, stage management

Nash, Elizabeth, Associate Professor
Ph.D., Indiana University
Voice, speech, singing

Nolte, Charles, Professor Emeritus
Ph.D., University of Minnesota
Theatre history, playwriting

Reid, Barbara, Professor
M.F.A., Yale University
Acting

Sealy, Zoe, Teaching Specialist
Jazz and ballroom dance, musical theatre

Shapiro, Linda, Coordinator
M.A., University of Wisconsin, Madison
Introduction to dance, dance history, technique and composition

Smith, Joan Anne, Associate Professor
M.A., University of California, Los Angeles
Modern dance, choreography

Wagner, Matthew, Assistant Professor
Ph.D., University of Minnesota
Theatre history and theory

Wagner, Sherry, Teaching Specialist
M.B.A., Illinois State University
Theatre management

Wolska, Aleksandra, Assistant Professor
Ph.D., Stanford University
Directing

■ *Women's Studies*

Desai, Jigna, Assistant Professor
Ph.D., University of Minnesota
Postcolonialism, Asian-American, South Asian diaspora, globalization, transnational cultural studies

Kaminsky, Amy, Professor
Ph.D., Pennsylvania State University
Feminist literary theory, Latin American women writers, exile

Longino, Helen, Professor
Ph.D., Johns Hopkins University
Feminist theories of knowledge, gender, philosophy of science

Nagar, Richa, Associate Professor
Ph.D., University of Minnesota
Feminist ethnography, cultural geography, international feminisms, development theory

Pough, Gwendolyn D., Assistant Professor
Ph.D., Miami University
Black public cultures, black women writers, theorizing black feminisms

§ Scheman, Naomi, Professor
Ph.D., Harvard University
Feminist epistemology, theories of individual and collective identity

Torres, Eden, Assistant Professor
Ph.D., University of Minnesota
Chicana feminist/cultural theory, race, class, gender, ethnicity

***§ Zita, Jacquelyn, Associate Professor**
Ph.D., Washington University
Feminist theory and philosophy, gender, lesbian/gay studies

Curtis L. Carlson School of Management

Administration

Lawrence Benveniste, Dean

Dennis Ahlberg, Associate Dean for Faculty and Research

John Anderson, Associate Dean for Administration

Michael Houston, Associate Dean for International Programs

Tim Nantell, Associate Dean for Domestic M.B.A. Program

Robert W. Ruekert, Associate Dean for Undergraduate Programs

Lori Bush, Director of Alumni Relations

Steven Hatting, Director of Development and Corporate Relations

Doug Lund, Director of the Office of Information Technology

Chris Mayr, Director of Advancement

Alice Pepin, Director of Communications and Marketing

Gary Lindblad, Assistant Dean and Director of M.B.A. Programs

Kathryn Carlson, Assistant Dean and Director of Evening M.B.A. Programs and Executive M.B.A. Programs

John Remington, Director of Labor Education Service

Thomas Donaldson, Director of Employer Education Service

Frederick R. Jacobs, Director of Graduate Studies, M.B.T. Program

Orville C. Walker, Director of Graduate Studies, Ph.D. Program in Business Administration

Gerald Rinehart, Assistant Dean and Director of Undergraduate Programs

William T. Scheurer, Director of Executive Development Center

Connie Wanberg, Director of Graduate Studies, M.A. and Ph.D. Programs in Industrial Relations

Mike Agnew, Assistant Dean and Director of Business Career Center

Mahmood Zaidi, Director of International Program Development

Candace McClenahan, Director of Managerial Communications

Faculty

■ *Accounting*

Amershi, Amin H., Professor
Ph.D., University of British Columbia
Information economics, game theory, decision theory

Antcil, Regina, Assistant Professor
Ph.D., University of Minnesota

Biondich, Nick, Lecturer
M.S., University of North Dakota

Caliendo, Charles, Lecturer
M.B.A., University of Minnesota

Carter, Gary, Lecturer
Ph.D., University of Texas, Austin

Dickhaut, John W., Professor and Curtis L. Carlson Chair in Accounting
Ph.D., Ohio State University
Economic and psychological determinants of accounting phenomena

Duke, Gordon L., Associate Professor
Ph.D., University of Georgia
Accounting systems, statistics, quantitative methods

§ Gutterman, Paul, Lecturer
L.L.M. in Taxation, New York University

Jacobs, Fred, Lecturer and Director of M.B.T.
Ph.D., University of Wisconsin, Madison

Joyce, Edward J., Professor
Ph.D., University of Illinois
Behavioral decision-making

Kanodia, Chandra, Professor, Arthur Anderson & Co/Duane R Kulberg Landgrant Chair in Accounting
Ph.D., Carnegie Mellon University
Auditor liability and audit pricing

Radhakrishna, Balkrishna, Assistant Professor
Ph.D., University of Michigan
Market regulations, investor behavior, price discovery, information dissemination

Rayburn, Judy D., Professor and Department Chair
Ph.D., University of Iowa
Capital markets

Shapiro, Brian, Assistant Professor
Ph.D., University of Minnesota
Behavioral judgment and decision making in accounting and other business contexts

Shroff, Pervin, Assistant Professor
Ph.D., Columbia University
Capital market based accounting

Spero, Andrew, Assistant Professor
Ph.D., Carnegie Mellon University
Control, incentive, accounting quality, learning issues

Tranter, Terry, Lecturer
Ph.D., University of Washington

Venkataraman, Ramgopal, Assistant Professor
Ph.D. (in progress), Penn State University
Financial accounting, disclosure

■ *Department of Business Law*

Andrews, Albert, Jr., Lecturer
L.L.B., University of Minnesota

■ *Finance*

Alexander, Gordon J., IDS Professor in Finance
Ph.D., University of Michigan
Investments, portfolio theory and management

Benveniste, Lawrence, U.S Bancorp Professor of Finance and Dean
Ph.D., University of California, Berkeley
Initial public offerings of equity, commercial mortgage default

Benzoni, Luca, Assistant Professor
Ph.D., Northwestern University
Asset pricing, time series econometrics, empirical finance

Boyd, John H., Professor, Frederick R. Kappel Chair in Business and Government Relations, and Department Chair
Ph.D., University of Pennsylvania
Finance and development, financial intermediation, banking, contract theory

Carkovic, Maria, Senior Fellow
Ph.D., University of California, Los Angeles
International economics, development economics, macroeconomics

Chang, Chun, Associate Professor
Ph.D., Northwestern University
Economics of incentives and information, comparative economic institutions

Gibson, Scott, Assistant Professor
Ph.D., Boston College
Financial institutions and markets, corporate finance

Ioffe, Ioulia, Assistant Professor
Ph.D., York University
Derivatives, investment, term structure estimation, pricing by arbitrage, fixed income securities

Kidwell, David S., Professor
Ph.D., University of Oregon
U.S. and international banking, fixed income securities

Levine, Ross, Curtis L. Carlson Professor of Finance
Ph.D., University of California, Los Angeles
International finance, financial regulations and policies, economic development

Nantell, Timothy J., Gelco Professor in Finance
Ph.D., University of Wisconsin
Corporate finance, corporate restructuring

Nelson, Richard, Lecturer
M.B.A., University of Minnesota

Polkovnichenko, Valery, Assistant Professor
Ph.D., Northwestern University
Asset pricing, incomplete markets, portfolio choice

Povel, Paul, Assistant Professor
Ph.D., London School of Economics
Financial contracting, corporate finance, corporate restructuring

*** Rosko, Peter, Associate Professor**
Ph.D., University of Michigan
Financial management

Seguin, Paul, Associate Professor
Ph.D., University of Rochester
Financial market structure and regulation, volatility, futures, REITs

Singh, Rajdeep, Assistant Professor
Ph.D., Carnegie Mellon University
Corporate finance, auction theory, agency models, mergers and acquisitions, market microstructure

Winton, Andrew, Professor, Minnesota Banking Industry Chair in Finance
Ph.D., Wharton School, University of Pennsylvania
Financial contracting, corporate finance

■ *Health Care Management*

Begun, James, Professor and Department Chair
Ph.D., University of North Carolina, Chapel Hill
Applications of complexity science

Cassirer, Christopher, Associate Professor
Ph.D., Johns Hopkins University
Executive education for health care administrators

Christianson, Jon, Professor, James A. Hamilton Chair in Health Policy and Management
Ph.D., University of Wisconsin
Evaluation of treatment processes

Connor, Robert, Associate Professor
Ph.D., Wharton School, University of Pennsylvania
Market structure and access to service in the health sector

Grant, Leslie, Assistant Professor
Ph.D., University of California, San Francisco
Financing, organization, and delivery of long-term care

Litman, Theodor, Professor Emeritus
Ph.D., University of Minnesota
Medical sociology, health politics and policy

Madden, Mary Jane, Assistant Professor
Ph.D., University of Minnesota

Parente, Stephen, Assistant Professor
Ph.D., Johns Hopkins University
Managed care, health information technology, heath economics

Potthoff, Sandra, Assistant Professor
Ph.D., University of Wisconsin, Madison
Decision making in health care

Weckwerth, Vernon, Professor
Ph.D., University of Minnesota
Variable effects on health service delivery

■ *Human Resources and Industrial Relations*

Ahlburg, Dennis A., Professor
Ph.D., University of Pennsylvania
Demographic economics, forecasting, labor economics

Arvey, Richard D., Professor
Ph.D., University of Minnesota
Staffing, training, and development

Azevedo, Ross E., Associate Professor
Ph.D., Cornell University
Compensation systems, human resource planning and skills inventories

Ben-Ner, Avner, Professor and Department Chair
Ph.D., State University of New York, Stony Brook
Theory of organization, employee ownership, nonprofit organizations

§ Bognanno, Mario F., Professor
Ph.D., University of Iowa
Labor markets, collective bargaining, arbitration

§ Budd, John, Associate Professor
Ph.D., Princeton University
Collective bargaining and industrial relations, labor policy

§ Fossum, John A., Professor
Ph.D., Michigan State University
Compensation

Glomb, Theresa, Assistant Professor
Ph.D., University of Illinois
Workplace aggression and violence, sexual harassment

Lluis, Stephanie, Assistant Professor
PhD., University of Montreal
Labor economics, applied economics

§ McCall, Brian, Associate Professor, Curtis L. Carlson Professor in Industrial Relations
Ph.D., Princeton University
Applied econometrics, econometric theory, economics of information

Miner, Andrew, Assistant Professor
Ph.D., University of Illinois
Job attitudes, moods, behaviors, small-group problem solving

Remington, John, Professor
Ph.D., University of Michigan
Collective bargaining and industrial relations, labor arbitration

Scoville, James G., Professor
Ph.D., Harvard University
International and comparative industrial relations

Wanberg, Connie, Associate Professor
Ph.D., Iowa State University
Psychological experience of unemployment, job-seeking behavior

Wang, Yijiang, Associate Professor
Ph.D., Harvard University
Organization theory, theory of the firm, monetary economics

Whitman, Andrew, Professor
Ph.D., University of Wisconsin, Madison
Insurance law, coverage and claims, corporate risk management

Zaidi, Mahmood A., Professor
Ph.D., University of California, Berkeley
International labor market analysis, human capital and multinationals

■ *Information and Decision Sciences*

Adams, Carl R., Professor
Ph.D., Purdue University
Problem-solving methodology

Adomavicius, Gediminas, Assistant Professor
Ph.D., New York University
Personalization technologies and customer relationship management, knowledge discovery and data mining

Chervany, Norman L., Professor
Ph.D., Indiana University
Management of technology-based change

Curley, Shawn P., Professor
Ph.D., University of Michigan
Decision and judgment processes, belief processing

Davis, Gordon B., Honeywell Professor of Management Information Systems
Ph.D., Stanford University
MIS planning, information requirements determination

Everest, Gordon C., Associate Professor
Ph.D., University of Pennsylvania
Database management systems, logical data modeling

Gupta, Alok, Associate Professor
Ph.D., University of Texas
Electronic commerce, data communication

Johnson, Paul E., Carlson Professor in Decision Sciences
Ph.D., Johns Hopkins University
Decision making, intelligent systems, knowledge work

Kauffman, Robert J., Professor and Department Chair
Ph.D., Carnegie Mellon University
Information technology and financial services

March, Salvatore, Professor
Ph.D., Cornell University
Database design, information systems development

Naumann, J. David, Associate Professor
Ph.D., University of Minnesota
Information systems development, application prototyping, telecommunications

Park, Jinsoo, Assistant Professor
Ph.D., University of Arizona
Heterogeneous and distributed database management and integration

Prasad, Baba, Assistant Professor
Ph.D., University of Pennsylvania
Economics and strategy in management information systems, analysis of IT practices in retail banking firms

Riggins, Frederick J., Assistant Professor
Ph.D., Carnegie Melon University
Business models for internet-based commerce, e-business strategy

Subramani, Mani, Assistant Professor
D.B.A., Boston University
Management of effective IS-user relationships, determinants of governance in IT mediated interorganizational relationships

Van Cleave, Robert, Lecturer/Coordinator
M.B.A., University of Minnesota

Wanninger, Les, Lecturer/Coordinator
Ph.D., Northwestern University
Electronic commerce, the emerging information industry, applications of imaging and multimedia technologies

Xia, Weidong, Assistant Professor
Ph.D., University of Pittsburgh
Organizational impact of information technology, IT infrastructure management, adoption/usage of IT

■ *Marketing and Logistics Management*

Beier, Frederick J., Professor Emeritus
Ph.D., Ohio State University
Inter-organizational logistics systems and chain management

§ Bergen, Mark, Associate Professor
Ph.D., University of Minnesota
Channels of distribution, pricing

Chandy, Rajesh, Assistant Professor
Ph.D., University of Southern California
Radical innovation, technology management

Dong, Yan, Assistant Professor
Ph.D., University of Maryland
Supply chain management and optimization

Hansen, Robert A., Associate Professor
Ph.D., University of Wisconsin
Developing marketing strategies for public sector services

Houston, Michael J., Professor, Grieve Chair and Department Chair
Ph.D., University of Illinois
Consumer behavior and culture, international marketing

John, Deborah Roedder, Professor, Curtis L. Carlson Chair in Marketing
Ph.D., Northwestern University
Children's consumer behavior, consumer information processing

John, George, Professor, Curtis L. Carlson Research Professorship
Ph.D., Northwestern University
Marketing channels, industrial marketing, high technology markets

Lau-Gesk, Loraine, Assistant Professor
PhD., University of California, Los Angeles
Culture and persuasion, affect and cognition

Meyers-Levy, Joan, Professor
Ph.D., Northwestern University
Consumer information processing and psychology, gender differences in information processing

Loken, Barbara J., Professor
Ph.D., University of Illinois
Consumer behavior: brand equity, attitude measurement, categorization

Narasimhan, Om, Assistant Professor
Ph.D., University of Southern California
Inter-organizational arrangements, competitive advantage

Rao, Akshay, Associate Professor
Ph.D., Virginia Polytechnic Institute and State University
Pricing

§ Roering, Kenneth J., Professor, Pillsbury/Gerot Chair in Marketing
Ph.D., University of Iowa
Marketing planning and corporate strategy, market-driven new product development

Ruekert, Robert W., Professor
Ph.D., University of Wisconsin
Marketing strategy, marketing organization and implementation

Walker, Orville C., Professor
Ph.D., University of Wisconsin
Organizational issues in implementation of marketing structures

■ *Operations and Management Science*

Anderson, John C., Professor, Department Chair
Ph.D., University of Minnesota
Quality management, operations strategy, operations analysis

Donohue, Karen, Assistant Professor
Ph.D., Northwestern University
Supply chain management, design and analysis of manufacturing systems

Hill, Arthur V., Professor
Ph.D., Purdue University
Operations management, production and inventory management, international operations management

Li, William, Associate Professor
Ph.D., University of Waterloo
Experimental design, optimal design, robust design

Linderman, Kevin, Assistant Professor
Ph.D., Case Western Reserve University
Statistical quality control, quality management, manufacturing planning and control systems, six sigma

Mallick, Debasish, Assistant Professor
Ph.D., University of Texas, Austin
Management of technology, new product development

Meyer Goldstein, Susan, Assistant Professor
Ph.D., Ohio State University
Quality management in health care, service process management, operations strategy

Nachtsheim, Christopher J., Professor
Ph.D., University of Minnesota
Experimental design, regression and analysis of variance

*** Schroeder, Roger G., Professor, Frank A. Donaldson Chair in Operations Management**
Ph.D., Northwestern University
Operations strategy, quality management, process and product innovation

Sinha, Kingshuk, Associate Professor
Ph.D., University of Texas, Austin
Management of technology, operations strategy

Taaffe, Michael R., Associate Professor
Ph.D., Ohio State University
Stochastic processes and applied probability, Monte Carlo simulation methodology

■ *Strategic Management and Organization*

Abrams, Lori, Lecturer
Ph.D., University of Minnesota

Albert, Stuart, Associate Professor
Ph.D., Ohio State University
Organizational change, metaphor and organizational change

Bowie, Norman E., Professor, Elmer L. Andersen Chair in Corporate Responsibility
Ph.D., University of Rochester, New York
Corporate responsibility, international business ethics, leadership

Bromiley, Philip, Professor, Curits L. Carlson Chair in Strategic Management
Ph.D., Carnegie Mellon University
Risk-taking in organizations, strategic decision processes

Cardozo, Richard N., Professor Emeritus, Entrepreneurial Studies
Ph.D., University of Minnesota
Growth and development of new businesses

Cuervo-Cazurra, Alvaro, Assistant Professor
Ph.D., Massachusetts Institute of Technology
International management, corporate governance, strategic management and process

Erickson, W. Bruce, Professor
Ph.D., Michigan State University
Antitrust economics, venture capital, Minnesota small businesses

Fine, Alan, Lecturer
M.B.A., University of Minnesota

Forbes, Daniel, Assistant Professor
Ph.D., New York University
Strategic decision making, venture creation in internet-related industries

Fox, Isaac, Lecturer
Ph.D., University of Minnesota

Lenway, Stefanie, Professor and Department Chair
Ph.D., University of California, Berkeley
International trade policy, international political economy

Maitland, Ian, Professor
Ph.D., Columbia University
Business ethics, ethics and markets, international business

Marcus, Alfred A., Professor
Ph.D., Harvard University
Acquisition of competence and organizational learning

Mauriel, John J., Jr., Associate Professor
D.B.A., Harvard University
Public school leadership and strategy, executive education, organizational change

Murtha, Thomas, Associate Professor
Ph.D., New York University
Global sourcing strategy and management, industrial policy

Nichols, Mary L., Professor
Ph.D., University of Kansas
Individual and organizational decision making, organizational design

Peteraf, Margaret, Associate Professor
Ph.D., Yale University
Competitive advantage, resource-based theory

Sapienza, Harry, Professor, Curtis L. Carlson Chair in Entrepreneurial Studies
Ph.D., University of Maryland
Inter-organizational relationships, strategic decision making

Schnatterly, Karen, Assistant Professor
Ph.D., University of Michigan
Internal and external governance, white collar crime

Shah, Priti P., Associate Professor
Ph.D., Northwestern University
Social networks, group goal setting, negotiation

Shaver, J. Myles, Associate Professor
Ph.D., University of Michigan
Firm exporting strategies, investment location choice

Van de Ven, Andrew H., Professor, Vernon H. Heath Chair of Organizational Change and Innovation
Ph.D., University of Wisconsin
Organization and management theory, management of innovation and change

Zaheer, Akbar, Professor
Ph.D., Massachusetts Institute of Technology
Competitive advantage for inter-firm relationships

Zaheer, Srilata, Professor
Ph.D., Massachusetts Institute of Technology
Dynamic competitive advantage, the process of globalization

Zellmer-Bruhn, Mary, Assistant Professor
Ph.D., University of Wisconsin
Class cultural issues in teamwork, time related effects in organizational behavior

Division of Medical Technology

Administration

Furcht, Leo T., Professor and Head, Department of Laboratory Medicine and Pathology
M.D., State University New York, Upstate Medical Center
Cell matrix, basement membranes, tumor metastasis, peptides

Spannaus-Martin Donna, Yvonne C. Cooke Professor and Director
Ph.D., Iowa State University
Clinical chemistry, distance education

Solberg, Patricia, Administrative Associate
B.A., Gustavus Adolphus College
Education, student recruitment and retention, clinical chemistry

Faculty

Brunzel, Nancy, Laboratory Manager
M.S., University of Minnesota
Clinical chemistry, urinalysis, molecular biology

Gleason, William, Associate Professor
Ph.D., University of Minnesota
Clinical chemistry, biomaterials, biomolecular recognition

Hanson, Naomi, Assistant Professor
M.S., University of Minnesota
Clinical chemistry, molecular biology

Swinehart, Cheryl, Assistant Professor
M.S., University of Minnesota
Hemostasis, hematology

Tsai, Michael, Professor
Ph.D., Medical College of Wisconsin
Biochemical/molecular genetics, cardiovascular disease, clinical chemistry

Tudor, Kim-Sue, Assistant Professor
Ph.D., University of Cincinnati
Regulation of B-lymphopoiesis in mice and humans

Wells, Carol, Mildred King Rohwer Professor
Ph.D., University of Wisconsin, Madison
Diagnostic microbiology and microbial pathogenesis

Teaching Specialists

Clysdale, Sarah, Teaching Specialist
B.S., University of Minnesota
Clinical chemistry

Coley, Nancy, Teaching Specialist
B.S., University of Minnesota
Immunohematology

George, Joanna, Manager, Teaching Laboratories
B.S., Minot State University, S.B.B., Tidewater Red Cross, Norfolk, Virginia
Immunohematology, microbiology, laboratory safety

Lorenz, Janet, Teaching Specialist
B.S., Moorhead State University
Hematology

King, Lynn, Teaching Specialist
B.S., University of Minnesota
Clinical chemistry

Yue, Mary Jane, Teaching Specialist
M.S., Northeastern University
Hematology

Mortuary Science

Faculty and Staff

LuBrant, Michael P., Assistant Professor and Director
M.A., St. Bernard's Institute
Embalming, restorative art, funeral psychology and counseling

Mathews, Michael C., Assistant Professor
M.A., University of St. Thomas
Funeral management, history, embalming chemistry, computer science

Tibetts, Steven P., Teaching Specialist
M.A., University of Minnesota, Duluth
Funeral psychology and counseling, funeral management

College of Natural Resources

Administration

Alfred D. Sullivan, Ph.D., Dean

TBD, Ph.D., Associate Dean

Melvin J. Baughman, Ph.D., Assistant Dean

Bobby L. Berwin, B.A., Assistant to the Dean

TBD, M.S., Director of Development

Terri L. Ritz, Director of Financial Services

Martin H. Moen, M.A., Coordinator of Communications

Barbara A. Coffin, M.S., Coordinator, Institute for Sustainable Natural Resources

James A. Perry, Ph.D., Head, Department of Fisheries, Wildlife, and Conservation Biology

Joseph G. Massey, Ph.D., Head, Department of Wood and Paper Science

Alan R. Ek, Ph.D., Head, Department of Forest Resources

William K. Ganzlin, M.S., Director, Student Services; Coordinator, Natural Resources and Environmental Studies

Robert A. Stine, Ph.D., Cloquet Forestry Center

Philip J. Splett, M.S., Coordinator, Career Services

Scott M. Lanyon, Ph.D., Director, James Ford Bell Museum of Natural History

Faculty

■ *Fisheries, Wildlife, and Conservation Biology*

Adelman, Ira R., Professor
Ph.D., University of Minnesota
Fisheries management, physiology, aquaculture

Andersen, David E., Associate Professor
Ph.D., University of Wisconsin, Madison
Avian ecology and conservation

Cohen, Yosef, Professor
Ph.D., University of California, Berkeley
Populations, mathematical ecology, ecosystem conservation

Cooper, James A., Associate Professor Emeritus
Ph.D., University of Massachusetts
Waterfowl and wetland ecology

Cuthbert, Francesca J., Professor
Ph.D., University of Minnesota
Conservation and biology of birds, endangered species conservation

DelGiudice, Glenn D., Adjunct Associate Professor
Ph.D., University of Minnesota
Nutritional and physiological ecology of large mammals

Frenzel, L. Daniel, Professor Emeritus
Ph.D., University of Minnesota
Raptor ecology

Fulton, David C., Assistant Professor
Ph.D., Colorado State University
Human dimensions of biological conservation

Garshelis, David, Adjunct Associate Professor
Ph.D., University of Minnesota
Monitoring and managing large mammal populations

Johnson, Mark R., Adjunct Associate Professor
D.V.M., Colorado State University
Wildlife handling and techniques for research and management

Jordan, Peter A., Associate Professor
Ph.D., University of California, Berkeley
Ecology and management of mammalian herbivores

Joshi, Anup, Research Associate
Ph.D., University of Minnesota
Asian mammal conservation

Kapuscinski, Anne R., Professor
Ph.D., Oregon State University
Fisheries genetics, aquatic biotechnology assessment

Kitts, James R., Professor Emeritus
Ph.D., Utah State University
Extension education, human-wildlife interactions

Mech, L. David, Adjunct Professor
Ph.D., Purdue University
Wolf ecology and behavior

Miller, Loren M., Research Associate
Ph.D., University of Minnesota
Fisheries conservation genetics

Nelson, Kristen C., Assistant Professor
Ph.D., University of Michigan
Human dimensions of natural resources, environmental management

Newman, Raymond M., Associate Professor
Ph.D., University of Minnesota
Aquatic ecology and fisheries management

Pereira, Donald L., Adjunct Assistant Professor
Ph.D., University of Minnesota
Population and community dynamics: ecosystem management

*** Perry, James, Professor and Department Head**
Ph.D., Idaho State University
Water quality, applied aquatic ecology, environmental management

Simons, Andrew M., Assistant Professor
Ph.D., University of Alabama, Tuscaloosa
North American freshwater fish systematics

Smith, James L.D., Professor
Ph.D., University of Minnesota
Biology and conservation of Asian mammals

Sorensen, Peter W., Professor
Ph.D., University of Rhode Island
Fish behavior, physiology and chemoreception

Spangler, George R., Professor
Ph.D., University of Toronto
Population dynamics of fish, native American resource management

Swain, Edward B., Adjunct Assistant Professor
Ph.D., University of Minnesota
Effects of air pollution on lakes, fish, and wildlife

Vondracek, Bruce C., Professor
Ph.D., University of California, Davis
Stream ecology and restoration

Waters, Thomas F., Professor Emeritus
Ph.D., University of Minnesota
Stream ecology

■ *Forest Resources*

Alm, Alvin A., Professor Emeritus
Ph.D., University of Minnesota
Silviculture, reforestation

Anderson, William H., Adjunct Faculty
Ph.D., University of Michigan
Remote sensing

Anderson, Paul D., Research Associate
Ph.D., University of California, Berkeley
Silviculture, tree physiology

§ Anderson, Dorothy H., Professor
Ph.D., Colorado State University
Recreation resources management and policy analysis

Ascerno, Mark E., Jr., Adjunct Faculty
Ph.D., Pennsylvania State University
Forest entomology: forest and urban plant pest control

Bakuzis, Egolfs V., Professor Emeritus
Ph.D., University of Minnesota
Forest ecology, ecosystem foundations

Bauer, Marvin E., Professor
Ph.D., University of Illinois
Remote sensing of soils, crops and forests

Baughman, Melvin, J., Professor and Assistant Dean
Ph.D., University of Minnesota
Policy, taxation, economics and management

Befort, William A., Adjunct Faculty
Ph.D., University of Idaho
Remote sensing

Bengston, David N., Adjunct Faculty
Ph.D., University of Minnesota
Economics, technical change, research planning, evaluation

Berglund, Erwin R., Adjunct Faculty
Ph.D., University of Minnesota
Hydrology

Blanchette, Robert A., Adjunct Faculty
Ph.D., Washington State University
Forest pathology: forest and shade tree diseases

Blinn, Charles R., Professor
Ph.D., Virginia Polytechnic Institute and State University
Management, economics, marketing, and harvesting

Bolstad, Paul V., Associate Professor
Ph.D., University of Wisconsin
Geographic information systems and forest ecology

Brooks, Kenneth N., Professor
Ph.D., University of Arizona
Forest hydrology, modeling impacts of land use on water resources

Burk, Thomas E., Professor
Ph.D., University of Minnesota
Biometrics: forest growth modeling and experimental design

Carey, Eileen V., Assistant Professor
Ph.D., University of Illinois
Forest ecology, ecophysiology

Carlson, Stephan P., Associate Professor
Ph.D., Michigan State University
Youth development, park and recreation resources

Current, Dean A., Research Associate
Ph.D., University of Minnesota
Resource analysis, international forestry

Cushing, Edward J., Adjunct Faculty
Ph.D., University of Minnesota
Plant ecology

Daley Laursen, Steven B., Professor
Ph.D., University of Idaho
Silviculture, ecology, and policy

David, Andrew J., Assistant Professor
Ph.D., Michigan State University
Forest genetics

Demchik, Michael C., Adjunct Faculty
Ph.D., Pennsylvania State University
Agroforestry

Eckman, Karlyn, Adjunct Faculty
Ph.D., University of Minnesota
Community/social forestry planning

Ek, Alan R., Professor and Department Head
Ph.D., Oregon State University
Resource survey design, modeling forest dynamics, research planning

Ellefson, Paul V., Professor Emeritus
Ph.D., Michigan State University
Economics, policy, and administration

Erkkila, Dan L., Adjunct Faculty
Ph.D., University of Minnesota
Resource analysis

Frelich, Lee E., Research Associate
Ph.D., University of Wisconsin
Forest ecology

Gilmore, Daniel W., Assistant Professor
Ph.D., University of Maine
Silviculture

Gregersen, Hans M., Professor Emeritus
Ph.D., University of Michigan
Economics, social cost-benefit analysis, international forestry

Grigal, David F., Adjunct Faculty
Ph.D., University of Minnesota
Forest soils

Haight, Robert G., Adjunct Faculty
Ph.D., Oregon State University
Economics and operations research

Hallgren, Alvin R., Professor Emeritus
Ph.D., University of Minnesota
Forest management and harvesting

Hansen, Henry L., Professor Emeritus
Ph.D., University of Minnesota
Silviculture and forest ecology

Hansen, Mark H., Adjunct Faculty
Ph.D., University of Minnesota
Forest survey, DBMS

Hoganson, Howard M., Associate Professor
Ph.D., University of Minnesota
Management and economics: timber supply and harvest scheduling

Irving, Frank D., Professor Emeritus
Ph.D., University of Minnesota
Public administration, management, and forest fires management

Isebrands, Jud G., Adjunct Faculty
Ph.D., Iowa State University
Tree physiology

Jakes, Pamela, Adjunct Faculty
Ph.D., University of Minnesota

Johnson, Gary R., Associate Professor
M.S., Western Illinois University
Urban and community forestry

Johnson, Gerald W., Adjunct Faculty
Ph.D., University of Wisconsin
Surveying, mapping, photogrammetry

Kilgore, Michael A., Assistant Professor
Ph.D., University of Minnesota
Natural resources economics

Kurmis, Vilis, Professor Emeritus
Ph.D., University of Minnesota
Forest ecology

Leary, Rolfe A., Adjunct Faculty
Ph.D., University of Minnesota
Modeling forest dynamics

Lime, David W., Senior Research Associate Emeritus
Ph.D., University of Pittsburgh
Recreation resources management and tourism

McAvoy, Leo H., Jr., Adjunct Faculty
Ph.D., University of Minnesota
Management of outdoor recreation

McRoberts, Ronald E., Adjunct Faculty
Ph.D., University of Minnesota
Forest growth modeling

Merriam, Lawrence C., Jr., Professor Emeritus
Ph.D., University of Minnesota
Recreation resources management

Meyer, Merle P., Professor Emeritus
Ph.D., University of Minnesota
Remote sensing, aerial photography for natural resources management

Mohn, Carl A., Professor Emeritus
Ph.D., University of Minnesota
Forest genetics, tree improvement

Nelson, Kristen C., Assistant Professor
Ph.D., University of Michigan
Human dimensions of natural resources and environmental management

Nieber, John L., Adjunct Faculty
Ph.D., Cornell University
Forest hydrology

O'Brien, Joseph G., Adjunct Faculty
Ph.D., University of Minnesota
Forest pathology

Oleksyn, Jacek, Research Associate
Ph.D., Silesian University, Poland
Ecophysiology, tree biology

Ostry, Michael E., Adjunct Faculty
Ph.D., University of Minnesota
Forest pathology

Palik, Brian J., Adjunct Faculty
Ph.D., University of Michigan
Forest ecology

Phillips, Michael J., Adjunct Faculty
Ph.D., University of Canterbury, New Zealand
Forest soils

Pitt, David G., Adjunct Faculty
Ph.D., University of Arizona
Scenic resource management

Polasky, Stephen, Adjunct Faculty
Ph.D., University of Michigan
Ecological/environmental economics

Reich, Peter B., Professor and F.B. Hubachek, Sr. Chair in Forestry
Ph.D., Cornell University
Forest ecology, ecophysiology

Reichenbach, Mike, Adjunct Faculty
M.S., University of Illinois
Forest economic development

Riemenschneider, Donald E., Adjunct Faculty
Ph.D., University of Minnesota
Genetics: tree improvement

Rose, Dietmar W., Professor Emeritus
Ph.D., University of Wisconsin
Forest economics, planning, timber supply analysis

Runge, C. Ford, Adjunct Faculty
Ph.D., University of Wisconsin
Natural resource economics

Rusterholz, Kurt A., Adjunct Faculty
Ph.D., University of Wisconsin
Ecology of old growth forests

Sagor, Eli S., Adjunct Faculty
M.S., Yale University
Forest and landscape ecology

Schmidt, Thomas L., Adjunct Faculty
Ph.D., University of Nebraska, Lincoln
Multi-resource assessment

Schneider, Ingrid E., Research Associate
Ph.D., Clemson University
Recreation resource management

Scholten, Harold S., Professor Emeritus
Ph.D., University of Minnesota
Silviculture, windbreaks, shelterbelts

Seybold, Steven J., Assistant Professor
Ph.D., University of California, Berkeley
Forest entomology, insect-plant interactions, chemical ecology

Skok, Richard A., Dean Emeritus
Ph.D., University of Minnesota
Forest economics and policy

Smith, James L. David, Adjunct Faculty
Ph.D., University of Minnesota
Conservation biology

Splett, Philip J., Instructor
M.S., University of Minnesota
Career planning, plant taxonomy

Stine, Robert A., Adjunct Faculty
Ph.D., University of Minnesota
Forest genetics, forest policy, Cloquet Forestry Center

Sucoff, Edward I., Professor Emeritus
Ph.D., University of Maryland
Tree physiology, nutrient-water interactions, forest decline

Taff, Steven J., Adjunct Faculty
Ph.D., University of Wisconsin, Madison
Natural resource economics and policy

Thompson, Jerrilyn L., Research Fellow
M.S., University of Minnesota
Recreation resources management

Verry, Elon S., Adjunct Faculty
Ph.D., Colorado State University
Hydrology

Vogt, Carl E., Instructor
B.S., University of Minnesota
Conservation education, hardwood management, specialty crops

Yin, Xiwei, Research Associate
Ph.D., University of Minnesota
Forest ecology and modeling

Yount, Louise S., Adjunct Faculty
M.S., Oregon State University
Sustainable forestry education

Zasada, J. C., Adjunct Faculty
Ph.D., University of Michigan
Silviculture and regeneration ecology

Zenner, Erik K.
Ph.D., Oregon State University
Silviculture

■ *Wood and Paper Science*

*** Bowyer, James L., Professor**
Ph.D., University of Minnesota
Life cycle analysis, marketing

Bratkovich, Stephen M., Adjunct Faculty
Ph.D., Ohio State University
Extension education

Erickson, Robert W., Professor Emeritus
Ph.D., University of Minnesota
Wood physics and moisture relations

Gertjejansen, Roland O., Professor Emeritus
Ph.D., University of Minnesota
Fiber and particle products technology

Grimsrud, David T., Associate Professor Emeritus
Ph.D., University of Minnesota
Indoor air quality and building energy efficiency

Hendricks, Lewis T., Professor Emeritus
Ph.D., Michigan State University
Forest products extension and training

Huelman, Patrick H., Associate Professor
M.S., Iowa State University
Energy-efficient buildings

Massey, Joseph G., Professor and Department Head
Ph.D., University of Minnesota
Operations research concepts, process control expert systems

Milton, F. Thomas, Associate Professor
M.S., University of Minnesota
Lumber manufacturing technology

Petersen, Harlan D., Assistant Professor
M.S., University of Minnesota
Wood moisture relations

Ramaswamy, Shri, Associate Professor
Ph.D., State University of New York
Paper science and engineering

Reichenbach, Michael R., Adjunct Faculty
M.S., University of Illinois
Extension educator

Sarkanen, Simo, Professor
Ph.D., University of Washington
Wood and lignin chemistry

Schmidt, Elmer L., Professor
Ph.D., University of Minnesota
Wood deterioration/protection

Shmulsky, Rubin, Assistant Professor
Ph.D., Mississippi State University
Material science

Seavey, Robert T., Research Associate
Ph.D., University of Minnesota
Wood physics

Severtson, Steven J., Assistant Professor
Ph.D., Institute of Paper Science and Technology
Surface chemistry

Smith, Timothy M., Assistant Professor
Ph.D., Pennsylvania State University
Forest products marketing

Tschirner, Ulrike W., Associate Professor
Ph.D., University of Karlsruhe, Germany
Lignin chemistry

Yin, Kewen Karen, Associate Professor
Ph.D., University of Maryland
Process monitoring and control

School of Nursing

Administration

Sandra R. Edwardson, Ph.D., Dean

Marilee Miller, Ph.D., Associate Dean

Ruth Lindquist, Ph.D., Division Head I

Helen Hansen, Ph.D., Acting Division Head II

Marsha Lewis, Ph.D., Director of Graduate Studies

Judy Beniak, M.P.H., R.N., Director, Student Services

Paul Sodergren, B.S., Administrative Director

Sharon Vegoe, B.S., Director, Outreach

Laurel Mallon, B.S., Development Officer

Faculty

Avery, Melissa, Associate Professor
Ph.D., University of Minnesota
Exercise as therapeutic intervention for gestational diabetes

Bearinger, Linda, Professor
Ph.D., University of Minnesota
Public health needs of adolescents

Beniak, Judy, Instructor and Director of Student Services
M.P.H., University of Minnesota
Administration and public health

Bliss, Donna, Assistant Professor
Ph.D., University of Pennsylvania
Effects of dietary fiber on colon

Block, Derryl, Assistant Professor
Ph.D., University of Pennsylvania
Public health nursing

Bohn, Diane, Assistant Professor
D.N.Sc., Rush University, Chicago
Effects of abuse on women's health

Brauer, Donna, Assistant Professor
Ph.D., University of Minnesota
Health outcomes in adults with chronic conditions

Chlan, Linda L., Assistant Professor
Ph.D., University of Minnesota
Technology and home health nursing, holistic interventions

*** Duckett, Laura, Associate Professor**
Ph.D., University of Minnesota
Variables that affect breastfeeding duration

Edwardson, Sandra, Professor and Dean
Ph.D., University of Minnesota
Administrative and health care policy issues

Fairbanks, Dorothy M., Assistant Professor
M.Ed., University of Minnesota
Educational methodologies to enhance critical thinking

Feldt, Karen, Assistant Professor
Ph.D., University of Minnesota
Quality of life for institutionalized elders

Garwick, Ann, Associate Professor
Ph.D., University of Minnesota
Children with chronic disabilities and their families

Gerdner, Linda, Assistant Professor
Ph.D., University of Iowa
Management of agitation in Alzheimer's disease and related disorders (ADRD), culturally sensitive care for persons with ADRD and their family caregivers

Gerkensmeyer, Janis, Assistant Professor
Ph.D., Indiana University
Child psychiatric nursing

Gross, Cynthia, Professor
Ph.D., Yale University
Quality of life after transplantation

Gustafson, Marilyn R., Associate Professor Emeritus
Ph.D.

Halcón, Linda, Assistant Professor
Ph.D., University of Minnesota
Public health nursing, epidemiology

Hansen, Helen, Ph.D., Associate Professor and Acting Division Head II
Ph.D., University of Kansas, Lawrence
Leadership, collaboration, and systems management

Henly, Susan J., Associate Professor
Ph.D., University of Minnesota
Psychometric methods

Hodge, Felicia, Professor
Ph.D., University of California, Berkeley

Josten, LaVohn, Associate Professor Emeritus
Ph.D., University of Minnesota
Effectiveness of interventions with high-risk families

§ Kaas, Merrie, Assistant Professor
D.N.Sc., University of California, San Francisco
Mental health of elderly women

Kerr, Madeline, Assistant Professor
Ph.D., University of Michigan
Health promotion interventions with workers

Kraatz, Elizabeth, Assistant Professor
Ph.D., Loyola University, Chicago
Oncology

Kreitzer, Mary Jo, Assistant Professor
Ph.D., University of Minnesota
Complementary care therapies

Krichbaum, Kathleen, Associate Professor
Ph.D., University of Minnesota
Quality of long-term care for institutionalized elderly

Leonard, Barbara, Professor and Division Head II
Ph.D., University of Minnesota
Fetal alcohol syndrome, juvenile diabetes, Indian health care

Lewis, Marsha, Associate Professor and Director of Graduate Studies
Ph.D., University of Minnesota
Psychiatric mental health nursing practice

Lia-Hoagberg, Betty, Associate Professor
Ph.D., University of Minnesota
Pregnancy care, public health interventions

Liaschenko, Joan, Associate Professor
Ph.D., University of California, San Francisco
Nursing ethics

Lindeke, Linda, Associate Professor
Ph.D., University of Minnesota
Maternal child health issues, children with chronic illness

Lindquist, Ruth, Associate Professor and Division Head I
Ph.D., University of Minnesota
Cardiovascular nursing, critical care nursing, quality of life

Miller, Marilee, Associate Professor and Associate Dean
Ph.D., University of Minnesota
Oncology nursing, technology-enhanced learning

Moss, Margaret, Assistant Professor
D.S.N., University of Texas, Houston
Gerontology, organizational systems, policy/planning

Mueller, Christine, Associate Professor
Ph.D., University of Maryland, Baltimore
Adult health, gerontology

O'Boyle, Carol, Assistant Professor
Ph.D., University of Minnesota
International health, nursing theory, infectious disease, infection control, nursing leadership

Peden-McAlpine, Cynthia, Assistant Professor
Ph.D., Adelphi University, Garden City, New York
Critical care in nursing, public health nursing

Pederson, Carol, Associate Professor
Ph.D., University of Minnesota
Promoting comfort in children undergoing painful procedures

Plumbo, Margaret, Instructor
M.S., C.N.M., University of Minnesota
Nurse widwifery, women's health, depression and the family

Post-White, Janice, Associate Professor
Ph.D., University of Minnesota
Psychoneuroimmunology and cancer

Robertson, Cheryl, Assistant Professor
Ph.D., University of Minnesota
Public health nursing, international health, refugee health issues

Saewyc, Elizabeth, Assistant Professor
Ph.D., University of Washington
Adolescent and public health nursing

Snyder, Mariah, Professor Emeritus
Ph.D., University of Minnesota
Nursing interventions, identification and determining efficacy

Struthers, Roxanne, Assistant Professor
Ph.D, University of Minnesota
American Indian health and health care

Urueta, Romana, Assistant Professor
M.S., University of California, Los Angeles
Pediatric nursing

Weisensee, Mary G., Assistant Professor
Ph.D., Michigan State University
Caregivers' perceptions

Wyman, Jean, Professor
Ph.D., University of Washington
Urinary incontinence, behavioral interventions, quality of life

Education Specialists

Alaniz, Kären
Ph.D., University of Minnesota
Asthma self-management in children, chronic illness in children

Bata-Jones, Bonnie
M.S., F.N.P., University of North Dakota, Grand Forks
Diabetes education

Benbenek, Mary
M.S., F.N.P., P.N.P., University of Minnesota
Primary care, pharmacology, pediatrics

Bergren, Martha
M.S., P.H.N., L.S.N., SUNY, Buffalo
Child health, informatics, public health—school nursing

Carey, Kris
M.S.N., University of Minnesota
Oncology, diabetes, renal-adult med/surg

Cross, Sharon
M.P.H., University of Minnesota
Prevention of unintended pregnancy, evaluation of public health nursing practice

Daniels, Jessie
M.S., University of Iowa
Medical surgical nursing

Fink, Lisa
M.S.N., C.N.M., University of Colorado Health Sciences Center
Maternal child

Flitter, Beth
M.S., C.S., C.A.R.N., Georgia State University
Therapeutic communication, psychiatric/mental health nursing, psychiatric clinicals, alternative medicine, continuing education classes on psych/mental health

Hanninen, Linda
M.S., University of Minnesota
Maternal child health

Garcia, Carolyn
M.S., M.P.H., University of Minnesota

Gauwitz, Donna
M.S., Northwestern University

Juve, Cathy
Ph.D., University of Minnesota
Substance abuse in pregnancy

Matsuura, Gloria
M.S., C.N.M., University of Minnesota
Nurse midwifery

Nygaard, Georgia
M.S., A.N.P., College of St. Catherine, St. Paul
Primary care of adults

Peters, Jennifer
Ph.D., University of Iowa
Gerontology

Poe, Christine
M.P.H., University of Minnesota
Pediatric nurse practitioner

Quast, Sharon
M.P.H., University of Minnesota
Education/mental health and pediatrics, role modeling

Ringdahl, Deborah
M.S., University of Minnesota
Nurse midwifery

Rowan, Mary
Ph.D., University of Minnesota
Maternal-child health/childbearing families

Sabati, Navid
M.S.N., D'Youville College (New York)

Saline, Elaine
M.P.H., University of Minnesota
Mental health and community

Shelton, Dixie
M.S., P.M.H.N., University of Minnesota

Smith, Kevin
M.S.N., F.N.P., University of Kentucky
Family nursing

Sprayberry, Lynn
Ph.D., University of Kansas

Steffes, Mary
M.S., University of Minnesota
Adult health, critical care

Institute of Technology

Administration

H. Ted Davis, Regents Professor and Dean

Steven Crouch, Associate Dean, Finance and Planning

Peter Hudleston, Associate Dean, Student Affairs

K.S.P. Kumar, Associate Dean, Academic Affairs

Kristine Kosek, Director, Alumni Relations

Sharon B. Kurtt, Director, Career Services

James Leger, Director, Lower Division Programs

Susan Ellis Marino, Director, Program for Women

Madonna Monette, Director, Finance

Phil Oswald, Director, Development

Robert Pepin, Director, Honors

Benjamin G. Sharpe, Director, Admissions

Frank Snowden, Director, Academic Program for Excellence in Engineering and Science

Paul Sorenson, Director, Communications

Karen Wolterstorff, Associate to the Dean

Faculty

In the following list, P.E. designates licensure as a professional engineer in Minnesota, unless otherwise indicated.

■ *Aerospace Engineering and Mechanics*

Balas, Gary J., Associate Professor
Ph.D., California Institute of Technology
Aerospace control systems, experimental and theoretical

§ Beavers, Gordon S., Professor
Ph.D., Cambridge University
Experimental fluid mechanics, rheological fluid mechanics

Candler, Graham V., Professor
Ph.D., Stanford University
Hypersonic aerodynamics, computational fluid dynamics, high-temperature gas physics thermochemical non-equilibrium flows

Enns, Dale F., Adjunct Associate Professor
Ph.D., Stanford University
Controls, dynamics, aeroelasticity, flight mechanics, dynamical systems

Ericksen, Jerry L., Professor Emeritus
Ph.D., Indiana University
Nonlinear continuum theories on behavior of real materials (crystals and liquid crystals)

Fosdick, Roger L., Professor
Ph.D., Brown University
Thermodynamics and continuum mechanics, nonlinear material behavior

Garrard, William L., Professor
Ph.D., University of Texas at Austin
Dynamics and control of aerospace vehicles, parachute dynamics

Hodge, Philip G., Jr., Professor Emeritus
Ph.D. , Brown University
Plastic minimum principles, limit analysis and yield-line theory

Hsiao, C. C., Professor Emeritus
Ph.D., Massachusetts Institute of Technology
Effect of molecular orientation, time on polymeric, composite systems

James, Ashley, Assistant Professor
Ph.D., Georgia Institute of Technology
Fluid dynamics, interfacial fluid flow and computational fluid dynamics

James, Richard D., Distinguished McKnight University Professor
Ph.D., Johns Hopkins University
Thermodynamics of solids, phase transformations, micromagnetics

Joseph, Daniel D., Regents Professor
Ph.D., Illinois Institute of Technology
Two phase flow, rheology, fluid mechanics, stability bifurcation

Leo, Perry H., Associate Professor
Ph.D., Carnegie Mellon University
Phase transformations, micromechanics of defects in solids, composites

Longmire, Ellen K., Associate Professor
Ph.D., Stanford University
Experimental fluid mechanics, particle-laden and multiphase flow

Lundgren, Thomas S., Professor Emeritus
Ph.D., University of Minnesota
Vortex dynamics, turbulence, two-phase flows, tube transportation systems

Mahesh, Krishnan, Assistant Professor
Ph.D., Stanford University
Numerical simulation and modeling of fluid flows, plasma-assisted materials processing

Marusic, Ivan, Assistant Professor
Ph.D. University of Melbourne, Australia
Experimental and theoretical study of turbulent boundary layers.

Mesbahi, Mehran, Assistant Professor
Ph.D., University of Southern California
Multiple spacecraft formation flying, optimization, system theory and control

Plunkett, Robert, Professor Emeritus
Sc.D., Massachusetts Institute of Technology,
Structural dynamics, fluid-solid interaction, composite materials, vibrational control

Shield, Thomas W., Associate Professor
Ph.D., University of California, Berkeley
Experimental solid mechanics, mechanics of materials, fracture mechanics

Stolarik, Eugene, Associate Professor Emeritus
M.S., University of Minnesota
Flight mechanics of aircraft and reentry vehicles, V/STOL, aerodynamics

Truskinovsky, Lev, Associate Professor
Ph.D., Academy of Sciences, U.S.S.R.
Nonlinear continuum mechanics, thermodynamics, fracture, phase transformations, geophysics

§ Vano, Andrew
B.A.E., University of Minnesota
FAA DER (Flight analyst, structures, systems and equipment, power plant installation and test pilot)

Warner, William H., Professor Emeritus
Ph.D., Carnegie Institute of Technology
Optimization methods in mechanics, biorthogonal series for solutions of polyharmonic equations

Wilson, Theodore A., Professor
Ph.D., Cornell University
Respiratory mechanics, modeling lung structure and deformation, respiratory flow

§ Zhao, Yiyuan, Associate Professor
Ph.D., Stanford University
Guidance/control, optimization, dynamics, air traffic management

■ *Astronomy*

Davidson, Kris, Professor
Ph.D., Cornell University
Theoretical astrophysics, luminous stars, primordial element abundances

§ Dickey, John, Professor
Ph.D., Cornell University
Galactic and extragalactic radio astronomy, neutral hydrogen studies

§ Gehrz, Robert, Professor and Director, Mt. Lemmon and O'Brien observatories
Ph.D., University of Minnesota
Infrared astronomy, novae, comets

§ Humphreys, Roberta, Professor
Ph.D., University of Michigan
Luminous stars, stellar evolution, optical spectroscopy, galactic structure

§ Jones, Terry, Professor and Assistant Director, Mt. Lemmon and O'Brien observatories
Ph.D., University of Hawaii
Infrared astronomy, late type stars, polarimetry

Jones, Thomas, Professor
Ph.D., University of Minnesota
Computational astrophysics, cosmic ray production, supernovae remnants, shocks

Kuhi, Leonard, Professor
Ph.D., University of California, Berkeley
Young stellar objects, optical spectroscopy

***§ Rudnick, Lawrence, Professor**
Ph.D., Princeton University
Galactic and extragalactic radio astronomy, supernova remnants

§ Skillman, Evan, Professor
Ph.D., University of Washington
Extragalactic observational astronomy, cosmic elemental abundances, dwarf galaxies

Williams, Liliya, Assistant Professor
Ph.D., University of Washington
Cosmology, gravitational lensing

Woodward, Paul, Professor and Director of Laboratory for Computational Science and Engineering
Ph.D., University of California, Berkeley
Computational astrophysics, numerical techniques

■ *Biomedical Engineering*

Barocas, Victor H., Assistant Professor
Ph.D., University of Minnesota
Computational biomechanics, intraocular transport, microfluidics, mechanical interactions between cells and extracellular matrix

Bischof, John C., Associate Professor
Ph.D., University of California, Berkeley
Experimental techniques to measure biophysics in cells and tissues during freezing, improved cryopreservation of sperm and tissue systems, characterization of cell injury

Odde, David J., Associate Professor and Director of Undergraduate Studies
Ph.D., Rutgers University
Microtubule dynamics, microfabrication of artificial tissues

Polla, Dennis L., Professor
Ph.D., University of California, Berkeley
Design, materials growth, and fabrication of integrated microsensors and microactuators; integrated circuit technologies

Siegel, Ronald A., Professor and Department Head of Pharmaceutics
Sc.D., Massachusetts Institute of Technology
Swelling and mass transport properties and hydrogels as a function of environmental variables, novel drug delivery systems

Steinmetz, Peter N., Assistant Professor
M.D., Ph.D., Johns Hopkins University
Quantitative descriptions of brain structure and function, engineering devices for brain stimulation and recording

Suggs, Laura J., Research Associate/ Lecturer
Ph.D., Rice University
Physiologically responsive biomaterials—use and behavior in cardiovascular applications

Tranquillo, Robert T., Professor, Department Head, and Director of Graduate Studies
Ph.D., University of Pennsylvania
Cell migration and the properties of tissue-equivalents—cell-populated collagen and fibrin matrices

■ *Biosystems and Agricultural Engineering*

Bhattacharya, Mrinal, Professor
Ph.D., University of Nebraska
Food engineering, extrusion processing, starch/protein-based polymers

Boedicker, James, Adjunct Associate Professor
Ph.D., North Carolina State University
Machinery systems, machine safety, livestock environment

Chaplin, Jonathan, P.E., Associate Professor
Ph.D., Iowa State University
Machinery design, safety, precision farming machinery, computer-aided design

Clanton, Charles, P.E., Professor
Ph.D., University of Minnesota
Waste management: water, air quality, odor, and storage

Goodrich, Philip, P.E., Associate Professor
Ph.D., Purdue University
Odor control systems for animal waste, manure application

Izuno, Forrest, Professor
Ph.D., Colorado State University
Water management, irrigation, drainage, water quality

Jacobson, Larry, P.E., Professor, Extension Engineer, and Department Head
Ph.D., University of Minnesota
Livestock housing, indoor air quality, waste management

Janni, Kevin, P.E., Professor and Extension Engineer
Ph.D., Purdue University
Livestock housing, odor control, air quality, biofiltration

Morey, R. Vance, Professor
Ph.D., Purdue University
Grain drying and storage, grain quality, machine vision

Nieber, John, P.E., Professor
Ph.D., Cornell University
Fluid flow, heat and contaminant transport in unsaturated soil

Ruan, Roger, Professor
Ph.D., University of Illinois
Food engineering, value-added processing, MRI and NMR applications, non-thermal plasma

Sands, Gary, Assistant Professor and Extension Engineer
Ph.D., Colorado State University
Hydrology, water quality, water resources conservation and management

Shutske, John, Associate Professor and Extension Agricultural Safety and Health Specialist
Ph.D., Purdue University
Agricultural safety and health, human factors, safety engineering design

Wilcke, William, P.E. (Iowa), Professor and Extension Engineer
Ph.D., Iowa State University
Post-harvest technology, sustainable agriculture, agricultural energy sources

Wilson, Bruce, P.E. (Oklahoma), Associate Professor
Ph.D., University of Kentucky
Hydrologic/water quality modeling, transport of surface water contaminants

Wright, Jerry, P.E., Associate Professor and Extension Engineer
M.S., North Dakota State University
Irrigation design and management, drainage, ground water quality

Zhu, Jun, Assistant Professor and Extension Engineer
Ph.D., University of Illinois
Waste management and treatment techniques, odor control

■ *Chemical Engineering and Materials Science*

Aris, Rutherford, Professor Emeritus
D.Sc., University of London
Theoretical studies of chemical reactors

Bates, Frank S., Professor
Sc.D., Massachusetts Institute of Technology
Thermodynamics and dynamics of polymers and polymer mixtures

Caretta, Raul, Professor
Ph.D., University of Minnesota
Unit operations, safety, surface characterization

Carr, Robert W., Professor
Ph.D., University of Rochester
Chemical kinetics, reaction engineering

§ Carter, C. Barry, Professor
D. Phil., Oxford University
Electron microscopy of semiconductors and ceramics, solid-state reaction and growth of thin films

Chelikowsky, James R., Professor
Ph.D., University of California, Berkeley
Structural/electronic properties of solids

Cook, Robert F., Associate Professor
Ph.D., University of New South Wales
Fracture and deformation of materials and thin films

§ Cussler, Edward L., Professor
Ph.D., University of Wisconsin
Mass transfer, novel separation processes

Dahler, John S., Professor Emeritus
Ph.D., University of Wisconsin
Nonequilibrium statistical mechanics, atomic collision theory

Daoutidis, Prodromos, Associate Professor
Ph.D., University of Michigan
Nonlinear process control, process analysis and design

Davis, H. Ted, Regents Professor and Dean
Ph.D., University of Chicago
Colloid and interface science, statistical mechanics

Derby, Jeffrey J., Professor
Ph.D., Massachusetts Institute of Technology
Process modeling, materials processing, high-performance computing

Evans, D. F., Professor
Ph.D., Massachusetts Institute of Technology
Interfacial phenomena, surfactant microstructures

Francis, Lorraine Falter, Associate Professor
Ph.D., University of Illinois at Urbana-Champaign
Ceramics processing, electrical and mechanical properties of ceramics

Fredrickson, Arnold G., Professor Emeritus
Ph.D., University of Wisconsin
Biochemical engineering, microbial populations

Frisbie, C. Daniel, Associate Professor
Ph.D., Massachusetts Institute of Technology
Organic electronic materials, materials chemistry

Geankoplis, Christie J., Professor
Ph.D., University of Pennsylvania
Biochemical engineering, reactors and mass transport

Gerberich, William W., Professor
Ph.D., University of California, Berkeley
Fracture micromechanics, interfacial defects

Hu, Wei-Shou, Professor
Ph.D., Massachusetts Institute of Technology
Biochemical engineering, mammalian cell cultures

Kaznessis, Yiannis, Assistant Professor
Ph.D., University of Notre Dame
Computer modeling of biological systems, bioinformatics

Keller, Kenneth H., Professor
Ph.D., Johns Hopkins University
Transport in biological systems, biomedical engineering

Kumar, Satish, Assistant Professor
Ph.D., Stanford
Transport processes, interfacial phenomena, microfluidics

Leighton, Christopher, Assistant Professor
Ph.D., University of Durham, England
Magnetic and electronic properties of thin film, magnetic materials

Lodge, Timothy P., Professor
Ph.D., University of Wisconsin
Polymer structure and dynamics, polymer characterization

Macosko, Christopher W., Professor
Ph.D., Princeton University
Polymer processing, rheology, polymer networks and blends

McClurg, Richard B., Assistant Professor
Ph.D., California Institute of Technology
Thermodynamics and kinetics of phase changes

McCormick, Alon V., Professor
Ph.D., University of California, Berkeley
Ceramic synthesis, adsorption and diffusion, polymerization kinetics

Morse, David C., Assistant Professor
Ph.D., University of Pennsylvania
Macromolecular and complex fluids, statistical mechanics and dynamics

Norris, David J., Associate Professor
Ph.D., Massachusetts Institute of Technology
Photonic crystals, nanomaterials, molecular spintronics

Oriani, Richard A., Professor Emeritus
Ph.D., Princeton University
Corrosion, thermodynamics of solids, cold fusion

Palmstrom, Chris J., Professor
Ph.D., University of Leeds
Epitaxial growth processes and heterostructure formation, properties of thin films

Ranz, William E., Professor Emeritus
Ph.D., University of Wisconsin
Fluid mechanics and transport, heat and mass transfer

Schmidt, Lanny D., Professor
Ph.D., University of Chicago
Surface chemistry, catalysis and reactor modeling

Scriven, L. E., Regents Professor
Ph.D., University of Delaware
Flow processing solidification, porous media, microstructured liquids

Shores, David A., Professor
Ph.D., Pennsylvania State University
High temperature corrosion, fuel cells

Sivertsen, John M., Associate Professor Emeritus
Ph.D., University of Illinois
Magnetic, microelectronic and tribological materials

Smyrl, William H., Professor
Ph.D., University of California, Berkeley
Electrochemical engineering, modeling electrochemical systems

Snowden, Frank W., Professor
Ph.D., University of New Orleans
Intraocular lens design and performance, cooperative education

Srienc, Friedrich, Professor
Ph.D., Technical University of Graz
Biochemical engineering, cell cycle kinetics

Tranquillo, Robert T., Professor
Ph.D., University of Pennsylvania
Cell and tissue engineering

Ward, Michael D., Professor
Ph.D., Princeton University
Molecular materials, piezoelectric transducers

Wentzcovitch, Renata M. M., Associate Professor
Ph.D., University of California, Berkeley
Electronic and structural properties of solids, ab initio molecular dynamics

■ *Chemistry*

Arriaga, Edgar, Assistant Professor
Ph.D., Dalhousie University in Nova Scotia
Analytical chemistry

Barany, George, Distinguished McKnight University Professor
Ph.D., Rockefeller University
Organic and biological chemistry

Blank, David, Assistant Professor
Ph.D., University of California, Berkeley
Experimental physical chemistry

Bowser, Michael, Assistant Professor
Ph.D., University of British Columbia
Bioanalytical chemistry

Buhlmann, Philippe, Assistant Professor
Ph.D., Swiss Federal Institute of Technology
Analytical chemistry and materials

Carr, Peter, Professor
Ph.D., Pennsylvania State University
Analytical chemistry

Cramer, Christopher, Associate Professor
Ph.D., University of Illinois, Urbana-Champaign
Organic, physical, and computational chemistry

Dahler, John, Professor Emeritus
Ph.D., University of Wisconsin
Physical chemistry

Davis, H. Ted, Regents Professor and Dean
Ph.D., University of Chicago
Chemical engineering

Distefano, Mark, Associate Professor
Ph.D., Massachusetts Institute of Technology
Biological chemistry

Ellis, John, Professor
Ph.D., Massachusetts Institute of Technology
Inorganic chemistry

Forsyth, Craig, Associate Professor
Ph.D., Cornell University
Organic and biological chemistry

Gao, Jiali, Assistant Professor
Ph.D., Purdue University
Biological and computational chemistry

Gentry, W. Ronald, Professor
Ph.D., University of California, Berkeley
Physical chemistry

Gladfelter, Wayne, Professor
Ph.D., Pennsylvania State University
Inorganic, materials, and organic chemistry

§ Gray, Gary Professor
Ph.D., University of Iowa
Biological and organic chemistry

Hillmyer, Marc, Associate Professor
Ph.D., California Institute of Technology
Organic chemistry

Hoye, Thomas, Professor
Ph.D., Harvard University
Organic chemistry

Hsung, Richard, Assistant Professor
Ph.D., University of Chicago
Organic chemistry

Kass, Steven, Professor
Ph.D., Yale University
Organic and physical chemistry

Leopold, Doreen, Associate Professor
Ph.D., Harvard University
Physical chemistry

Leopold, Ken, Professor
Ph.D., Harvard University
Physical chemistry

Lipsky, Sanford, Professor
Ph.D., University of Chicago
Physical chemistry

Lodge, Timothy, Professor
Ph.D., University of Wisconsin
Analytical, materials, and physical chemistry

§ Mann, Kent, Professor
Ph.D., California Institute of Technology
Inorganic chemistry

McNeill, Kristopher, Assistant Professor
Ph.D., University of California, Berkeley
Environmental chemistry

§ Miller, Larry, Professor
Ph.D., University of Illinois, Urbana-Champaign
Organic and materials chemistry

Miller, Wilmer, Professor Emeritus
Ph.D., University of Wisconsin
Physical chemistry

Musier-Forsyth, Karin, Associate Professor
Ph.D., Cornell University
Biological and physical chemistry

Noland, Wayland, Professor
Ph.D., Harvard University
Organic chemistry

O'Doherty, George, Assistant Professor
Ph.D., Ohio State University
Organic chemistry

Penn, R. Lee, Assistant Professor
Ph.D., University of Wisconsin, Madison
Environmental, materials, and physical chemistry

***§ Pignolet, Louis, Professor**
Ph.D., Princeton University
Inorganic and materials chemistry

Que, Larry, Professor
Ph.D., University of Minnesota
Inorganic and biological chemistry

Roberts, Jeffrey, Associate Professor
Ph.D., Harvard University
Physical, inorganic, and materials chemistry

Siepmann, J. Ilja, Associate Professor
Ph.D., University of Cambridge
Physical, materials, and computational chemistry

Stankovich, Marian, Professor
Ph.D., University of Texas
Analytical and biological chemistry

Stein, Andreas, Associate Professor
Ph.D., University of Toronto
Inorganic, physical, and materials chemistry

Taton, T. Andrew, Assistant Professor
Ph.D., Harvard University
Organic and materials chemistry

§ Tolman, William, Professor
Ph.D., University of California, Berkeley
Inorganic, organic, and biological chemistry

§ Truhlar, Donald, Professor
Ph.D., California Institute of Technology
Physical and theoretical chemistry

Veglia, Gianluigi, Assistant Professor
Ph.D., University of Rome
Physical chemistry

York, Darrin, Assistant Professor
Ph.D., University of North Carolina, Chapel Hill
Physical, theoretical, and computational chemistry

Zhu, Xiaoyang, Associate Professor
Ph.D., University of Texas at Austin
Materials, physical, and analytical chemistry

■ *Civil Engineering*

Arndt, Roger E. A., Professor
Ph.D., Massachusetts Institute of Technology
Cavitation and bubble dynamics, hydropower, noise generated by fluid flow

Arnold, William A., Assistant Professor
Ph.D., Johns Hopkins University
Transformations of anthropogenic chemicals aquatic systems, importance of abiotic vs. biotic reductants, partitioning and fate of organic chemicals

Barnes, Randal J., Associate Professor
Ph.D., Colorado School of Mines
Applied statistics, mathematical modeling, groundwater mechanics

Brezonik, Patrick L., Professor
Ph.D., University of Wisconsin
Impacts of human activity on water quality/chemistry

Capel, Paul D., Adjunct Associate Professor
Ph.D., University of Minnesota
Environmental water chemistry, chemodynamics, fate and transport

Crouch, Steven L., Professor
Ph.D., University of Minnesota
Boundary element methods applied to rock mechanics problems

Cundal, Peter, Adjunct Professor
Ph.D., Imperial College
Numerical modeling, micromechanical models of soils and rocks

Davis, Gary A., Associate Professor
Ph.D., University of Washington
Statistics in transportation planning, traffic control, traffic safety

Detournay, Emmanuel, Professor
Ph.D., University of Minnesota
Mathematical modeling of geomechanical processes, poroelasticity

§ Dexter, Robert J., Associate Professor
Ph.D., University of Texas at Austin
Steel structures, fatigue and fracture, welding, wind loading

§ Drescher, Andrew, Professor
Dr. Inz., Institute of Fundamental Technological Research, Poland
Testing and modeling mechanical behavior of geomaterials

Foufoula-Georgiou, Efi, Professor
Ph.D., University of Florida
Stochastic hydrology, multiscale processes, landform morphology, climate modeling

§ French, Catherine E., Professor
Ph.D., University of Illinois
Concrete behavior, materials/structural systems, earthquake engineering, durability

Galambos, Theodore V., Professor Emeritus
Ph.D., Lehigh University
Structural stability, behavior and design

Gulliver, John S., Professor
Ph.D., University of Minnesota
Environmental fluid mechanics, chemical fate and transport

Guzina, Bojan B., Assistant Professor
Ph.D., University of Colorado
Mathematical modeling of wave propagation, seismic site characterization.

§ Hajjar, Jerome F., Associate Professor
Ph.D., Cornell University
Steel structures, composite structures, nonlinear analysis, testing, design

Hondzo, Miki, Associate Professor
Ph.D., University of Minnesota
Experimental work and numerical prediction techniques in environmental fluid dynamics

Hozalski, Raymond M., Assistant Professor
Ph.D., Johns Hopkins University
Water/wastewater treatment, biofilms, natural organic matter characterization

§ Johnson, Gerald W., Associate Professor
Ph.D., University of Wisconsin, Madison
Developing new applications of surveying and mapping

Kwon, Eil, Adjunct Assistant Professor
Ph.D., University of Minnesota
Transportation systems, traffic control

§ Labuz, Joseph F., Associate Professor
Ph.D., Northwestern University
Experimental geomechanics, fracture of quasi-brittle materials

LaPara, Timothy, Assistant Professor
Ph.D., Purdue University
Biological wastewater treatment, wastewater microbiology, environmental microbiology, structure-function relationships in mixed microbial communities, microbial ecology, microbial evolution

Levinson, David M., Assistant Professor
Ph.D. University of California, Berkeley
Transportation economics and financing, network deployment, integrated transportation and land use planning

Marasteanu, Mihai, Assistant Professor
Ph.D., Pennsylvania State University
Applications of fundamental theories to bituminous materials characterization, modeling, and experimental testing

Michalopoulos, Panos G., Professor
Ph.D., University of Florida
Traffic engineering operations and control, traffic flow theory

Novak, Paige J., Assistant Professor
Ph.D., University of Iowa
Toxic compound biodegradation, interactions between anaerobes and metals

Parker, Gary, Professor
Ph.D., University of Minnesota
River engineering, mechanics and morphology and oceanic sedimentation

Porte-Agel, Fernando, Assistant Professor
Ph.D., Johns Hopkins University
Fluid mechanics in the environment, hydrology, micrometerology, atmospheric boundary layer, turbulence transport

Schultz, Arturo E., Associate Professor
Ph.D., University of Illinois, Urbana-Champaign
Concrete behavior, masonry systems, steel-concrete construction, earthquake engineering

Semmens, Michael J., Professor
Ph.D., University College London
Physical-chemical processes in environmental science and engineering

Shield, Carol K., Associate Professor
Ph.D., University of Illinois, Urbana-Champaign
Solid mechanics modeling, composite materials

*** Smith, Karl A., Associate Professor**
Ph.D., University of Minnesota
Project management, leadership, modeling, systems, engineering education

Song, Charles C. S., Professor Emeritus
Ph.D., University of Minnesota
Computational hydrodynamics, hydraulic transients, fluid mechanics, systems analysis

Stefan, Heinz G., Professor
Ph.D., University Paul Sabatier, Toulouse, France
Water quality modeling, environmental fluid mechanics, hydraulic structures

§ Stolarski, Henryk K., Professor
Ph.D., Institute of Fundamental Technological Research, Warsaw, Poland
Nonlinear structural mechanics, plates and shells, computational mechanics

Strack, Otto D. L., Professor
Dr. Ir., Delft University of Technology, The Netherlands
Computer and mathematical modeling of groundwater and transport

Voller, Vaughan R., Professor
Ph.D., Sunderland Polytechnic, UK
Numerical modeling of free and moving boundary problems

■ *Computer Science*

Boley, Daniel, Associate Professor
Ph.D., Stanford University
Numerical analysis, linear algebra, control theory

Carlis, John, Associate Professor
Ph.D., University of Minnesota
Database systems

Chen, Baoquan, Assistant Professor
Ph.D., SUNY, Stony Brook
Computer graphics, visualization

Du, David Hung-Chuang, Professor
Ph.D., University of Washington, Seattle
High-speed networking, multimedia applications, high-performance computing

Du, Ding-Zhu, Professor
Ph.D., University of California, Santa Barbara
Complexity theory, theory of computation, combinatorial optimization

Fox, David W., Professor Emeritus
Ph.D., University of Maryland
Applied mathematics, eigenvalue problems

Gini, Maria, Professor
Doctor of Physics, University of Milan
Artificial intelligence, robotics

Heimdahl, Mats, Associate Professor
Ph.D., University of California, Irvine
Software engineering, safety critical systems

Hsu, Wei, Associate Professor
Ph.D., University of Wisconsin, Madison
Compiler optimization, run-time optimization systems, system architectures

Interrante, Victoria, Assistant Professor
Ph.D., North Carolina at Chapel Hill
Visualization, visual perception, computer graphics, image processing, virtual reality

Janardan, Ravi, Professor
Ph.D., Purdue University
Computational geometry, algorithm and data structure design, computer graphics

Karypis, George, Assistant Professor
Ph.D., University of Minnesota
Data mining, bioinformatics, information retrieval, e-commerce, parallel processing

Konstan, Joseph, Assistant Professor
Ph.D., University of California, Berkeley
Human-computer interaction, collaborative filtering, multimedia systems, hypermedia

Kumar, Vipin, Professor
Ph.D., University of Maryland
Parallel processing, data mining

Meyer, Gary, Associate Professor
Ph.D., Cornell University
Computer graphics, color synthesis and reproduction

Nadathur, Gopalan, Associate Professor
Ph.D., Pennsylvania State University
Computational logic, programming language design and implementation

Norberg, Arthur, Professor
Ph.D., University of Wisconsin
History of science and technology

Papanikolopoulos, Nikolaos, Associate Professor
Ph.D., Carnegie Mellon University
Robotics, computer vision, sensors for transportation applications

Park, Haesun, Professor
Ph.D., Cornell University
Numerical analysis, parallel computing

Riedl, John, Associate Professor
Ph.D., Purdue University
Collaborative systems, database systems, fault tolerance, computer networks, object-oriented systems

Saad, Yousef, Professor
Doctorat, University of Grenoble, France
Sparse matrix computations, parallel computation, eigenvalue problems, nonlinear equations

Schrater, Paul, Assistant Professor
Ph.D., California State University, Long Beach
Human and computer vision, motor control and haptics, statistical inference, pattern recognition

Shekhar, Shashi, Associate Professor
Ph.D., University of California, Berkeley
Data and knowledge engineering, spatial database, geographic information systems

Shragowitz, Eugene, Professor
Ph.D., National Science Research Laboratory, Moscow
Computer aided design (CAD) of electronic systems, soft computing, combinatorial optimization

Slagle, James R., Professor Emeritus
Ph.D., Massachusetts Institute of Technology
Artificial intelligence (expert systems, neural networks, automated temporal logic)

Srivastava, Jaideep, Associate Professor
Ph.D., University of California, Berkeley
Databases, multimedia systems, data mining

Tripathi, Anand, Associate Professor
Ph.D., University of Texas at Austin
Distributed and network computing systems, object-oriented programming

Van Wyk, Erik, Assistant Professor
Ph.D., University of Iowa
Programming languages

Voyles, Richard, Assistant Professor
Ph.D., Carnegie Mellon University
Real-time systems, robotics, multiagent systems, teletaction

Weissman, Jon, Assistant Professor
Ph.D., University of Virginia
Distributed systems, metacomputing, cluster computing

Yew, Pen-Chung, Professor
Ph.D., University of Illinois, Urbana-Champaign
Computer architecture, parallel machine design, parallelizing compilers

Zhang, Zhi-Li, Assistant Professor
Ph.D., University of Massachusetts
Computer networking and multimedia systems

■ *Earth Sciences*

*** Alexander, E. Calvin, Jr., Professor**
Ph.D., University of Missouri, Rolla
Hydrogeology, karst hydrogeology and geomorphology, isotope geochemistry, groundwater pollution

Banerjee, Subir K., Professor
Ph.D., Sc.D., Cambridge University
Paleomagnetism, geomagnetism, climate change

Chandler, Val W., Adjunct Faculty
Ph.D., Purdue University
Gravity and magnetic exploration, Precambrian geology

Edwards, R. Lawrence, Professor
Ph.D., California Institute of Technology
Isotope geochemistry, climatic and oceanographic changes

Engstrom, Daniel R., Adjunct Faculty
Ph.D., University of Minnesota
Paleolimnology, limnochronology, geochemistry

Fox, David L., Assistant Professor
Ph.D., University of Michigan
Paleobiology, paleoclimatology, stable isotope ecology

Hirschmann, Marc M., Associate Professor
Ph.D., University of Washington
Geochemistry and experimental petrology, igneous petrogenesis, mantle melting

Hudleston, Peter J., Professor
Ph.D., Imperial College
Structural geology, deformation, faults and folds, tectonic history

Ito, Emi, Professor
Ph.D., University of Chicago
Stable isotope geochemistry and paleoclimatology

Johnson, Robert, Adjunct Faculty
Ph.D., Iowa State University
Mechanisms of climate change

Kirkby, Kent C., Adjunct Faculty
Ph.D., University of Wisconsin, Madison
Sedimentary geology, petroleum geology

Kleinspehn, Karen L., Associate Professor
Ph.D., Princeton University
Tectonics and basin analysis, neotectonics, sedimentary basins

Kohlstedt, David L., Professor
Ph.D., University of Illinois
Earth and planetary materials, mechanical properties of rocks, geodynamics and geochemistry

McSwiggen, Peter, Adjunct Faculty
Ph.D., University of Minnesota
Microbeam analysis and image processing

Miller, James D., Jr., Adjunct Faculty
Ph.D., University of Minnesota
Geologic mapping, petrology, metallogeny

Moskowitz, Bruce M., Professor
Ph.D., University of Minnesota
Rock magnetism, paleomagnetism, biogeomagnetism

Murthy, V. Rama, Professor
Ph.D., Yale University
Geochemistry of the mantle, radiogenic isotope systematics

*** Paola, Christopher, Professor**
Sc.D., Massachusetts Institute of Technology/Woods Hole Oceanographic Institution
Sedimentology, fluvial processes and morphology, stratigraphy

Patterson, Carrie J., Adjunct Faculty
Ph.D., University of Minnesota
Glacial processes, Minnesota glacial history, ice sheet dynamics

Pfannkuch, Hans-Olaf, Professor
Dr.Ing., Paris University
Hydrogeology, groundwater-surface interactions, hydrocarbon contamination of shallow aquifers

Runkel, Anthony C., Adjunct Faculty
Ph.D., University of Texas at Austin
Stratigraphic and sedimentologic attributes of Paleozoic strata

Seyfried, William E., Jr., Professor
Ph.D., University of Southern California
Aqueous geochemistry, experimental and theoretical modeling of hydrothermal systems

Stout, James H., Professor
Ph.D., Harvard University
Petrology, geochemistry, materials science, igneous and metamorphic petrology

Teyssier, Christian, Professor
Ph.D., Monash University
Structural geology and tectonics, orogenic processes, deformation and microstructures

Weiblen, Paul W., Professor Emeritus
Ph.D., University of Minnesota
Precambrian geology of Minnesota, crustal evolution and mineralization

Whitney, Donna L., Associate Professor
Ph.D., University of Washington
Metamorphic geology and tectonics, petrology and geochemistry of mountain belts

Wright, Herbert E., Jr., Regents Professor Emeritus
Ph.D., Harvard University
Quaternary paleoecology, paleolimnology, paleoclimatology, glacial geomorphology

Yuen, David A., Professor
Ph.D., University of California, Los Angeles
Numerical modeling of geophysical and geological phenomena, mantle convection

■ *Electrical Engineering*

Albertson, Vernon D., P.E., Professor Emeritus
Ph.D., University of Wisconsin, Madison
Electric power analysis and transients, geomagnetic pulse effects

Alouini, Mohamed, Assistant Professor
Ph.D., California Institute of Technology
Wireless communications

Bailey, Fredric N., Professor Emeritus
Ph.D., University of Michigan
Control systems, integrating new semi-conductor technology

Bazargan, Kiarash, Assistant Professor
Ph.D., Northwestern University
Computer-aided design of VLSI

§ Campbell, Stephen A., Professor
Ph.D., Northwestern University
Materials and fabrication processes for silicon-based structures

Champlin, Keith S., Professor Emeritus
Ph.D., University of Minnesota
New devices for fabricating monolithic microwave integrated circuits

Cherkassky, Vladimir S., Associate Professor
Ph.D., University of Texas at Austin
Parallel processing, computer networks, fault-tolerant computing

Cohen, Philip I., Professor
Ph.D., University of Wisconsin, Madison
Microelectronics materials, crystal growth

Drayton, Rhonda Franklin, Assistant Professor
Ph.D., University of Michigan
High-frequency and microwave circuits

Ebbini, Emal S., Associate Professor
Ph.D., University of Illinois, Urbana
Digital signal processing and biomedical engineering

Ernie, Douglas W., Associate Professor
Ph.D., University of Minnesota
Gaseous electronics and plasma engineering

Georgiou, Tryphon T., Professor
Ph.D., University of Florida
Control and systems theory, recursive modeling and identification

Giannakis, Georgios B., Professor
Ph.D., University of Southern California
Statistical signal processing and its application to wired and wireless communications

§ Gopinath, Anand, Professor
Ph.D., University of Sheffield
Microelectronics, microwaves, optics, optoelectronic devices

Harjani, Ramesh, Associate Professor
Ph.D., Carnegie Mellon University
Computer-aided design of analog circuits

Higman, Ted K., Associate Professor
Ph.D., University of Illinois
Electron device fabrication

Holte, James E., Associate Professor
Ph.D., University of Minnesota
Bioelectrical sciences and biomedical engineering

Jacobs, Heiko, Associate Professor
Ph.D., ETH in Zurich
Micro- and nanotechnology

Judy, Jack H. , Professor Emeritus
Ph.D., University of Minnesota
Magnetics and magnetic recording, multilayer thin film materials

Kain, Richard Y., Professor Emeritus
Sc.D, Massachusetts Institute of Technology
Computer system architecture

§ Kaveh, Mostafa, Professor
Ph.D., Purdue University
Statistical signal processing, communications, and image processing

Kieffer, John, Professor
Ph.D., University of Illinois, Urbana-Champaign
Information theory, communications, digital signal processing

Kiehl, Richard A., Professor
Ph.D., Purdue University
Microelectronics and nanoelectronics

Kinney, Larry L., Professor
Ph.D., University of Iowa
Digital system and digital computer design

Kumar, K. S. P., Professor
Ph.D., Purdue University
Adaptive control, self-tuning regulators, and system identification

Lambert, Robert F., Professor Emeritus
Ph.D., University of Minnesota
Acoustics, computer-controlled automatic measurement of sound

Lee, E. Bruce, Professor
Ph.D., University of Minnesota
Control system analysis and synthesis

Lee, Thomas (Shao-Chung) S., Professor Emeritus
Ph.D., University of Minnesota
Waves and fluids

§ Leger, James R., Professor
Ph.D., University of California, San Diego
Micro-optics, Fourier optics and holography

§ Lilja, David, Associate Professor
Ph.D., University of Illinois, Urbana-Champaign
High-performance computer architecture, parallel processing, supercomputing

Maziar, Christine M., Professor
Ph.D., Purdue University
Semiconductor devices

§ Mohan, Ned, Professor
Ph.D., University of Wisconsin, Madison
Power electronics and electromechanics for motion control

Moon, Jaekyun, Associate Professor
Ph.D., Carnegie Mellon University
Communications and signal processing

Nathan, Marshall I., Professor
Ph.D., Harvard University
High speed III-V semiconductor device physics

Nussbaum, Allen, Professor Emeritus
Ph.D., University of Pennsylvania
Basic principles of heterojunctions

Oskam, Hendrik J., Professor Emeritus
Ph.D., University of Utrecht
Microscopic and macroscopic properties of gaseous plasmas

Parhi, Keshab K., Professor
Ph.D., University of California, Berkeley
VLSI (Very Large Scale Integration) signal and image processing

§ Peria, William T., Professor Emeritus
Ph.D., University of British Columbia
Physical electronics, fabrication of integrated circuits

§ Polla, Dennis L., Professor
Ph.D., University of California, Berkeley
Design and fabrication of integrated microsensors and microactuators

Riaz, Mahmoud, Professor Emeritus
Sc.D., Massachusetts Institute of Technology
Electrical energy conversion, control, and processing

Robbins, William P., Professor
Ph.D., University of Washington
Sonics and ultrasonics, sensors and microactuators

Roychowdhury, Jaijeet, Associate Professor
Ph.D., University of California, Berkeley
Computer-aided verification of analog circuits

Ruden, P. Paul, Professor
Ph.D., University of Stuttgart, FRG
Theory of novel semiconductor devices

Sapatnekar, Sachin, Professor
Ph.D., University of Illinois at Urbana-Champaign
Computer aided design of VLSI systems

Sapiro, Guillermo, Professor
D.Sc., Technion University, Israel
Computer vision systems

Sidiropoulos Nikolaos D., Associate Professor
Ph.D., University of Maryland
Communications, networking and signal processing

Sobelman, Gerald E., Associate Professor
Ph.D., Harvard University
VLSI design

Stadler, Bethanie, Assistant Professor
Ph.D., Massachusetts Institute of Technology
Advanced materials for devices and systems

Talghader, Joseph, Assistant Professor
Ph.D., University of California, Berkeley
Microelectronics, optoelectronics

Tannenbaum, Allen R., Professor
Ph.D., Harvard University
Controlled active vision

Tewfik, Achmed H., Professor
Sc.D., Massachusetts Institute of Technology
Signal processing for multimedia

Victora, Randall, Professor
Ph.D., University of California, Berkeley
Magnetics

Warner, Jr., R.M., Professor Emeritus
Ph.D., Case Institute of Technology
Electronic device and circuit development

Wollenberg, Bruce F., Professor
Ph.D., University of Pennsylvania
Power systems engineering

Ziaie, Babak, Assistant Professor
Ph.D., University of Michigan
MEMS and bio-MEMS

■ *Geological Engineering*

Faculty listed under Civil Engineering

■ *Mathematics*

Adams, Scot, Professor
Ph.D., University of Chicago
Dynamical systems, foliations, ergodic theory

Aeppli, Alfred, Professor Emeritus
Ph.D., ETH, Zurich, Switzerland
Topology and geometry

Agard, Stephen, Professor
Ph.D., University of Michigan
Actuarial mathematics, complex variables

Anderson, Greg, Professor
Ph.D., Princeton University
Algebraic number theory, algebraic geometry

Aronson, Donald, Professor Emeritus
Ph.D., Massachusetts Institute of Technology
Partial differential equations, applied mathematics

Baxter, John R., Professor
Ph.D., University of Toronto
Probability

Bobkov, Sergey, Professor
Ph.D., Steklov Institute
Partial differential equations

Bramson, Maury, Professor
Ph.D., Cornell University
Probability

Calderer, Maria Carme, Professor
Ph.D., Heriot-Watt University
Applied mathematics, partial differential equations

Chacholski, Wojtek, Assistant Professor
Ph.D., University of Notre Dame
Topology

Ciocan-Fontanine, Ionut, Assistant Professor
Ph.D., University of Utah
Algebraic geometry

Cockburn, Bernardo, Associate Professor
Ph.D., University of Chicago
Numerical analysis

Conn, Jack, Associate Professor
Ph.D., Princeton University
Mathematical physics, differential geometry

Eagon, John A., Professor Emeritus
Ph.D., University of Chicago
Commutative algebra

Feshbach, Mark, Professor
Ph.D., Stanford University
Topology

§ Frank, David, Associate Professor
Ph.D., University of California, Berkeley
Topology

Friedman, Avner, Regents Professor
Ph.D., Hebrew University
Applied mathematics, differential geometry

Fristedt, Bert, Professor
Ph.D., Massachusetts Institute of Technology
Probability

Fuhrken, E. Gebhard, Associate Professor Emeritus
Ph.D., University of California, Berkeley
Logic

Garrett, Paul, Professor
Ph.D., Princeton University
Number theory

Gershenson, Hillel, Associate Professor
Ph.D., University of Chicago
Topology

Goldman, Jay, Professor
Ph.D., Princeton University
Combinatorics and knots

Gray, Lawrence, Professor
Ph.D., Cornell University
Probability

Gulliver, Robert, Professor
Ph.D., Stanford University
Partial differential equations, differential geometry

Harper, Laurence R., Associate Professor Emeritus
Ph.D., University of Chicago
Algebra

Harris, Morton, Professor
Ph.D., Harvard University
Group theory

Hejhal, Dennis, Professor
Ph.D., Stanford University
Analysis, number theory

Jain, Naresh, Professor
Ph.D., Stanford University
Probability

Jiang, Dihua, Associate Professor
Ph.D., Ohio State University
Group representation theory, number theory, harmonic analysis

Jodeit, Max A., Jr., Professor
Ph.D., Rice University
Harmonic analysis

Kahn, Donald, Professor
Ph.D., Yale University
Topology

Keel, Markus, Assistant Professor
Ph.D., Princeton University
Partial differential equations, harmonic analysis

Keynes, Harvey B., Professor
Ph.D., Wesleyan University
Topological dynamics, ergodic theory

§ Krylov, N. V., Professor
D.Sc., Moscow State University
Probability and partial differential equations

Kuske, Rachel, Associate Professor and McKnight Land-Grant Professor
Ph.D., Northwestern University
Applied mathematics

Leung, Nai-Chung, Associate Professor
Ph.D., Massachusetts Institute of Technology
Geometric analysis

Littman, Walter, Professor
Ph.D., New York University
Partial differential equations

Lowengrub, John, Professor and McKnight Land-Grant Professor
Ph.D., New York University
Numerical analysis

Luskin, Mitchell, Professor
Ph.D., University of Chicago
Numerical analysis

Lyubeznik, Gennady, Professor
Ph.D., Columbia University
Commutative algebra, algebraic geometry

Marden, Albert, Professor
Ph.D., Harvard University
Complex dynamics

McCarthy, Charles, Professor Emeritus
Ph.D., Yale University
Functional analysis

McGehee, Richard, Professor
Ph.D., University of Wisconsin
Dynamical systems, visualization

Messing, William, Professor
Ph.D., Princeton University
Algebraic geometry

Meyers, Norman, Professor
Ph.D., Indiana University
Partial differential equations

Miller, Willard, Professor
Ph.D., University of California, Berkeley
Applied mathematics

Miracle, Chester, Associate Professor
Ph.D., University of Kentucky
Math education, harmonic analysis

Moeckel, Richard, Professor
Ph.D., University of Wisconsin
Dynamical systems, celestial mechanics

Neuhauser, Claudia, Adjunct Associate Professor
Ph.D., Cornell University
Probability

Ni, Wei-Ming, Professor
Ph.D., New York University
Partial differential equations, nonlinear functional analysis

Nitsche, Johannes, Professor Emeritus
Dr. Phil., University of Göttingen, Germany
Partial differential equations, minimal surfaces

Olver, Peter, Professor
Ph.D., Harvard University
Mathematical physics

Othmer, Hans, Professor
Ph.D. University of Minnesota
Bio-mathematics

Polacik, Peter, Professor
Ph.D., Comenius University
Partial differential equations, dynamics systems

Pour-El, Marian B., Professor Emeritus
Ph.D., Harvard University
Mathematical logic

Prikry, Karel, Professor
Ph.D., University of California, Berkeley
Logic and set theory

Reich, Edgar, Professor
Ph.D., University of California, Los Angeles
Complex variables

Reiner, Victor, Professor and McKnight Land-Grant Professor
Ph.D., Massachusetts Institute of Technology
Combinatorics

Reitich, Fernando, Associate Professor
Ph.D., University of Minnesota
Applied mathematics

Rejto, Peter, Professor
Ph.D., New York University
Functional analysis

Richter, Wayne, Associate Professor
Ph.D., Princeton University
Logic and set theory

Roberts, Joel, Professor
Ph.D., Harvard University
Commutative algebra

Safonov, Mikhail, Professor
Ph.D., Moscow State University
Probability and partial differential equations

Santosa, Fadil, Professor
Ph.D., University of Illinois
Applied mathematics

Scheel, Arnd, Associate Professor
Ph.D., Free University of Berlin
Partial differential equations

Sell, George R., Professor
Ph.D., University of Michigan
Differential equations

Shen, Jianhong, Assistant Professor
Ph.D., Massachusetts Institute of Technology
Image and vision analysis

Sibuya, Yasutaka, Professor Emeritus
D.Sc., Tokyo University
Ordinary differential equations

Sperber, Steven I., Professor
Ph.D., University of Pennsylvania
Algebraic number theory and geometry

Stanton, Dennis, Professor
Ph.D., University of Wisconsin
Combinatorics

Storvick, David, Professor
Ph.D., University of Michigan
Complex variables

Sverak, Vladimir, Professor
Ph.D., Charles University, Prague, Czech Republic
Calculus of variations, nonlinear elasticity

Voronov, Alexander, Associate Professor
Ph.D., Moscow State University
Mathematical physics, algebra

Wang, Jiaping, Associate Professor
Ph.D., Cornell University
Differential geometry

Webb, Peter, Professor
Ph.D., University of London
Group theory

White, Dennis, Professor
Ph.D., University of California, San Diego
Combinatorics

■ *Mechanical Engineering*

Alexander, Jennifer K., Assistant Professor
Ph.D., University of Washington, Seattle
Comparative history of industrial culture

§ Arora, Sant Ram, Professor
Ph.D., Johns Hopkins University
Optimization concepts, resource allocation, capacity sizing, production facilities

§ Benjaafar, Saifallah, Associate Professor
Ph.D., Purdue University
Modeling, design and control of automated manufacturing of production systems

§ Bischof, John C., Associate Professor
Ph.D., University of California, Berkeley
Bioengineering, bioheat and mass transfer, cryobiology, hyperthermia

§ Blackshear, Perry L., Jr., Professor Emeritus
Ph.D., Case Institute of Technology
Bioengineering, combustion, applied thermodynamics

§ Chase, Thomas R., Associate Professor
Ph.D., University of Minnesota
Computer-aided design, mechanical engineering database, kinematics, machine design

Cooper, William L., Assistant Professor
Ph.D., Georgia Institute of Technology
Stochastic models, revenue management, queuing theory

§ Davidson, Jane H., Professor
Ph.D., Duke University
Fluid mechanics, solar energy, environmental engineering

§ Donath, Max, Professor
Ph.D., Massachusetts Institute of Technology
Sensors and control systems as applied to robotics and vehicles

§ Durfee, William K., Professor
Ph.D., Massachusetts Institute of Technology
Product design, real-time control, biomechanics, rehabilitation engineering

§ Eckert, Ernst R. G., Regents Professor Emeritus
Dr. Habil., Institute of Technology, Danzig
Heat and mass transfer, thermodynamics

***§ Erdman, Arthur G., P.E., Professor**
Ph.D., Rensselaer Polytechnic Institute
Computer-aided design, kinematics, biomechanics, microelectromechanical systems

§ Fletcher, Edward A., Professor Emeritus
Ph.D., Purdue University
Applied thermodynamics, very high temperature solar processes and thermochemistry

§ Frohrib, Darrell A., Professor Emeritus
Ph.D., University of Minnesota
Engineering design, vibration

Garrick, Sean, Assistant Professor
Ph.D., State University of New York at Buffalo
Heat and mass transfer, fluid mechanics, numerical methods

§ Girshick, Steven L., Professor
Ph.D., Stanford University
Plasma technology, materials synthesis, nucleation theory

§ Goldstein, Richard J., Regents Professor
Ph.D., University of Minnesota
Heat transfer, thermodynamics, fluid mechanics

Gupta, Diwakar, Associate Professor
Ph.D., University of Waterloo
Stochastic processes and queuing systems

Hayes, Caroline C., Associate Professor
Ph.D., Carnegie Mellon University
Manufacturing planning and feature extraction, artificial intelligence

§ Heberlein, Joachim V. R., Professor
Ph.D., University of Minnesota
Plasma technology, electrode effects, plasma coating and waste-treatment processes

***§ Ibele, Warren E., Professor Emeritus**
Ph.D., University of Minnesota
Heat transfer, thermodynamics, power

§ Kittelson, David B., Professor
Ph.D., University of Cambridge, England
Energy conversion, particle technology, combustion and propulsion

§ Klamecki, Barney E., Professor
Ph.D., University of Illinois, Urbana-Champaign
Manufacturing process modeling and control theory

§ Kortshagen, Uwe, Associate Professor
Dr. rer. nat., University of Bochum, Germany
Low-pressure processing plasmas, plasma contamination control, plasma modeling

§ Kuehn, Thomas H., P.E., Professor
Ph.D., University of Minnesota
HVAC and refrigeration, heat and mass transfer, filtration

§ Kulacki, Francis A., Professor
Ph.D., University of Minnesota
Convective transfer in porous and fractured media

§ Kvalseth, Tarald O., Professor
Ph.D., University of California, Berkeley
Human factors and ergonomics

§ Lewis, Jack L., Professor
Ph.D., University of California, Berkeley
Biomechanics

§ Li, Perry W., Assistant Professor
Ph.D., University of California, Berkeley
Nonlinear and intelligent control, biomechanics, rehabilitation engineering, transportation systems, manufacturing

§ Liu, Benjamin Y. H., Regents Professor Emeritus
Ph.D., University of Minnesota
Particle technology, environmental control, solar energy

§ Mantell, Susan C., Associate Professor
Ph.D., Stanford University
Manufacturing and design with composite materials

§ Marple, Virgil A., Professor
Ph.D., University of Minnesota
Particle technology and aerosol science, environmental engineering

McMurry, Peter H., Professor
Ph.D., California Institute of Technology
Aerosol science and engineering, environmental engineering

Nelson, Bradley, Associate Professor
Ph.D., Carnegie Mellon University
Intelligent control systems

Ogata, Katsuhiko, Professor Emeritus
Ph.D., University of California, Berkeley
Control systems, optimization techniques

Patankar, Suhas V., Professor Emeritus
Ph.D., University of London, England
Heat and mass transfer, fluid

§ Pfender, Emil, Professor Emeritus
Dr. Ing., University of Stuttgart, Germany
Arc technology, plasma heat transfer and plasma processing

§ Pui, David Y. H., Professor
Ph.D., University of Minnesota
Particle technology, environmental engineering

Rajamani, Rajesh, Assistant Professor
Ph.D., University of California, Berkeley
Control design and state estimation for nonlinear systems, fault diagnostics

§ Ramalingam, Subbiah, Professor
Ph.D., University of Illinois, Urbana-Champaign
Manufacturing sciences, machining, metalworking, tribology, arc technology, coating technology

§ Ramsey, James W. , Professor
Ph.D., University of Minnesota
Heat and mass transfer, thermal environmental engineering

Scott, Charles J., Associate Professor Emeritus
M.S., University of Minnesota
Heat and mass transfer, fluid mechanics, thermodynamics

§ Shulman, Yechiel, Professor Emeritus
Sc.D., Massachusetts Institute of Technology
Management of technology

§ Simon, Terrence W., P.E. (Colorado), Professor
Ph.D., Stanford University
Heat transfer, fluid mechanics, thermodynamics

***§ Sparrow, Ephraim M., Professor**
Ph.D., Harvard University
Heat and mass transfer, fluid mechanics, thermal issues in biomedical engineering

***§ Starr, Patrick J., Professor**
Ph.D., University of Minnesota
Modeling and simulation as applied to manufacturing systems and vehicle dynamics

§ Stelson, Kim A., Professor
Sc.D., Massachusetts Institute of Technology
Manufacturing, system dynamics and controls

§ Strykowski, Paul J., Professor
Ph.D., Yale University
Fluid mechanics, stability, mixing, turbulence control

§ Tamma, Kumar K., Professor
Ph.D., Old Dominion University
Finite elements, computational mechanics, structural dynamics

Zachariah, Michael R., Associate Professor
Ph.D., University of California, Los Angeles
Aerosol science and nanostructures materials, applied laser diagnostics

■ *Physics*

§ Bayman, Benjamin F., Professor Emeritus
Ph.D., University of Edinburgh
Research in theoretical nuclear physics

Broadhurst, John H., Professor
Ph.D., University of Birmingham
Experimental astrophysics, biophysics and nuclear physics

Campbell, Charles E., Professor
Ph.D., Washington University, St. Louis
Theoretical condensed matter physics

Cattell, Cynthia, Professor
Ph.D., University of California, Berkeley
Particle acceleration in astrophysical plasmas, aurora, space physics

Courant, Hans W. J., Professor Emeritus
Ph.D., Massachusetts Institute of Technology
Experimental high-energy physics

§ Crowell, Paul, Assistant Professor
Ph.D., Cornell University
Experimental condensed matter physics

Cushman, Priscilla, Professor
Ph.D., Rutgers University
Experimental particle physics, neutrino mass, medical imaging techniques

§ Dahlberg, E. Dan, Professor
Ph.D., University of California at Los Angeles
Magnetism in films, electrical conduction and magnetic microscopy

Dehnhard, Dietrich K., Professor Emeritus
Ph.D., University of Marburg
Experimental physics, interaction between mesons, nucleons, and nuclei

DuVernois, Michael, Assistant Professor
Ph.D., University of Chicago
Experimental astrophysics, high-energy physics

§ Ellis, Paul J., Professor
Ph.D., University of Manchester, U.K.
Research in theoretical nuclear physics

Freier, George D., Professor Emeritus
Ph.D., University of Minnesota
Atmospheric physics

Ganz, Eric, Associate Professor
Ph.D., University of California, Berkeley
Experimental condensed matter physics

Gasiorowicz, Stephen, Professor Emeritus
Ph.D., University of California at Los Angeles
Theoretical particle physics, field theory, quantum chromodynamics

Gherghetta, Tony, Assistant Professor
Ph.D., University of Chicago
Theoretical high-energy physics

Giese, Clayton F., Professor Emeritus
Ph.D., University of Minnesota
Chemical physics, superfluid helium, optics

§ Glazman, Leonid, Professor
Ph.D., Institute of Low Temperature Physics, Ukraine Academy of Sciences, U.S.S.R.
Condensed matter theory, mesoscopic correlated electron systems

§ Goldman, Allen M., Professor
Ph.D., Stanford University
Experimental condensed matter physics, superconductivity, disordered and dimensionally constrained materials

Greenlees, George W., Professor Emeritus
Ph.D., Cambridge University
Experimental nuclear physics, laser spectroscopy, quantum optics

Grosberg, Alexander, Professor
Ph.D., Moscow State University
Theoretical physics of polymers and biopolymers, theoretical biophysics

Halley, J. Woods, Professor
Ph.D., University of California, Berkeley
Theoretical condensed matter physics

Hamermesh, Morton, Professor Emeritus
Ph.D., New York University
Theoretical physics, mathematical physics

§ Hanany, Shaul, Assistant Professor
Ph.D., Columbia University
Experimental/observational astrophysics and cosmology

***§ Heller, Kenneth, Professor**
Ph.D., University of Washington
Undergraduate problem-solving, especially neutrinos

Hintz, Norton M., Professor Emeritus
Ph.D., Harvard University
Experimental nuclear physics

§ Hobbie, Russell K., Professor Emeritus
Ph.D., Harvard University
Medical physics

Huang, Cheng-Cher, Professor
Ph.D., University of Pennsylvania
Experimental condensed matter physics—liquid crystals

§ Johnson, Walter H., Professor Emeritus
Ph.D., University of Minnesota
Experimental physics, mass spectrometers

***§ Jones, Roger S., Professor Emeritus**
Ph.D., University of Illinois
Physics philosophy, humanistic physics, physics education

Kakalios, James, Professor
Ph.D., University of Chicago
Experimental condensed matter physics—amorphous semiconductors and granular media

§ Kapusta, Joseph, Professor
Ph.D., University of California, Berkeley
Theoretical high-energy nuclear physics, early universe

Kamenev, Alex, Associate Professor
Ph.D., Weizmann Institute of Science, Israel
Theoretical condensed matter physics

Kellogg, Paul J., Professor Emeritus
Ph.D., Cornell University
Physics of plasmas, generation of plasma waves

Kubota, Yuichi, Associate Professor
Ph.D., Tokyo University
Heavy flavor physics in experimental particle physics

Larkin, Anatoly, Professor
Ph.D., Kurchatov Institute of Atomic Physics
Theoretical condensed matter physics

§ Lysak, Robert, Professor
Ph.D., University of California, Berkeley
Theoretical space physics

Mantis, Homer T., Professor Emeritus
Ph.D., New York University
Atmospheric physics

Marquit, Erwin, Professor Emeritus
Ph.D., University of Warsaw
Philosophy of science

***§ Marshak, Marvin L., Professor**
Ph.D., University of Michigan
Experimental high-energy physics

Mueller, Joachim, Assistant Professor
Ph.D., Technical University of Munich
Experimental biophysics

***§ Olive, Keith A., Professor**
Ph.D., University of Chicago
Early universe cosmology, high energy physics

*** Pepin, Robert, Professor**
Ph.D., University of California, Berkeley
Origin and evolution of the solar system

Peterson, Earl A., Professor
Ph.D., Stanford University
High energy physics: proton decay and neutrino oscillations

§ Poling, Ronald A., Professor
Ph.D., University of Rochester
Experimental elementary particle physics, specializing in b quarks

Qian, Yong-Zhong, Assistant Professor
Ph.D., University of California, San Diego
Theoretical nuclear astrophysics

§ Rudaz, Serge, Professor
Ph.D., Cornell University
Theoretical high-energy physics, supersymmetry, astroparticle physics

Ruddick, Keith, Professor
Ph.D., University of Birmingham
Experimental high-energy physics

Rusack, Roger, Professor
Ph.D., Imperial College, U.K.
Experimental high-energy physics

Shapiro, Alan E., Professor
Ph.D., Yale University
History of science, Newton, optics, Scientific Revolution

Shifman, Mikhail, Professor
Ph.D., University of Moscow
Theoretical high-energy physics

Shklovskii, Boris, Professor
Ph.D., University of Leningrad
Theoretical condensed matter physics

Stuewer, Roger H., Professor Emeritus
Ph.D., University of Wisconsin, Madison
History of nuclear and quantum physics

Tang, Yau-Chien, Professor Emeritus
Ph.D., University of Illinois
Theoretical nuclear physics

Urheim, Jon, Assistant Professor
Ph.D., University of Pennsylvania
Experimental high energy physics

Vainshtein, Arkady, Professor
Ph.D., University of Novosibirsk
Theoretical high-energy physics

Valls, Oriol T., Professor
Ph.D., Brown University
Theoretical condensed matter physics

Voloshin, Mikhail, Professor
Ph.D., Institute of Theoretical and Experimental Physics, Moscow
Theoretical physics of elementary particles, quantum field theory

Waddington, Cecil J., Professor Emeritus
Ph.D., University of Bristol
Experimental astrophysics, cosmic ray physics

§ Walsh, Thomas F., Professor
Ph.D., University of California, Berkeley
Theoretical high-energy physics

Weyhmann, Walter, Professor Emeritus
Ph.D., Harvard University
Nuclear magnetic effects at very low temperatures

Wygant, John, Professor
Ph.D., University of California, Berkeley
Space plasma physics

Zimmermann, William, Jr., Professor Emeritus
Ph.D., California Institute of Technology
Physics of superfluid liquid helium

■ *Statistics*

Bingham, Christopher, Professor
Ph.D., Yale University
Directional data analysis, time series analysis, multivariate analysis

Chaloner, Kathryn M., Professor
Ph.D., Carnegie Mellon University
Bayesian statistics, experimental design, AIDS clinical trials

Cook, R. Dennis, Professor
Ph.D., Kansas State University
Experimental design, linear and nonlinear models, regression diagnostics, graphical methods

Dickey, James M., Professor
Ph.D., University of Michigan
Bayesian statistics, expert-opinion probability modeling, smoothing methods

Eaton, Morris L., Professor
Ph.D., Stanford University
Multivariate analysis, probability inequalities, decision theory, Bayesian inference

Geisser, Seymour, Professor
Ph.D., University of North Carolina, Chapel Hill
Bayesian inference, model selection, predictivism, sample reuse, screening tests

Geyer, Charles J., Professor
Ph.D., University of Washington
Constrained maximum likelihood, Monte Carlo likelihood, Markov chain Monte Carlo

Grund, Birgit, Associate Professor
Ph.D., Humboldt-Universitåt, Berlin
Curve estimation, kernel smoothing, AIDS research

Hawkins, Douglas M., Professor
Ph.D., Witwatersrand, Johannesburg, South Africa
Quality improvement, case diagnostics, geostatistics

Jiang, Tiefeng, Assistant Professor
Ph.D., Stanford University
Mathematical biology, pattern recognition, large deviations, Chen-Stein method

Jones, Galin, Assistant Professor
Ph.D., University of Florida
Computationally intensive statistical methods

Martin, Frank B., Associate Professor
Ph.D., Iowa State University
Experimental design, analysis of variance procedures, finite population sampling

Meeden, Glen D., Professor
Ph.D., University of Illinois
Bayesian inference, decision theory, finite population sampling

Oehlert, Gary W., Professor
Ph.D., Yale University
Data analysis, environmental trend analysis, nonparametric regression

Qiu, Peihua, Associate Professor
Ph.D., Ohio State University
Nonparametric curve/surface fitting, image processing, survival analysis

§ Sudderth, William D., Professor
Ph.D., University of California, Berkeley
Probability theory, stochastic games, foundations of statistics

Tierney, Luke, Professor
Ph.D., Cornell University
Reliability models, inference, approximate Bayesian methods, statistical computing

Weisberg, Sanford, Professor
Ph.D., Harvard University
Regression and modeling, diagnostics, graphical methods, computing