

Undergraduate Catalog

This is the Introduction, General Information, Policies, and Overview of Undergraduate Structure and Requirements sections of the 2000-2002 University of Minnesota Undergraduate Catalog.

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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 2000-2002. This catalog is an academic planning tool for undergraduates. To learn how to use it, read this page.

Directory of Undergraduate Programs/Majors

The directory on the following page lists majors and minors and their corresponding colleges as well as the type of degree offered and the page where the program can be found.

General Information

All undergraduates should read the **General Information section, beginning on page 7**. 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

This section describes bachelor's degree programs and their requirements. Detailed information about undergraduate degree programs and services is offered by the following colleges and programs:

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<i>Agricultural, Food, and Environmental Sciences, College of</i>	36
<i>Architecture and Landscape Architecture, College of</i>	64
<i>Biological Sciences, College of</i>	74
<i>Continuing Education, College of</i>	91
<i>Dental Hygiene, Program in</i>	105
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Each of these colleges or programs has its section in this catalog. To find an academic area of interest, use the **Directory of Undergraduate Programs/Majors** on the following page or use the index at the back of this catalog.

Course Descriptions

All undergraduate courses on the Twin Cities campus are listed in this section. See page 287 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, intersession 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 <<http://onestop.umn.edu/Courses/schedule.html>> and the *Course Guide* can be found <<http://onestop.umn.edu/Courses/guide.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.

Find it

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



Directory of Undergraduate Programs/Majors

<i>Degree Program</i>	<i>College/School</i>	<i>Degree</i>	<i>Page</i>
Accounting	Management	B.S.B.	204
Actuarial Science	Management	B.S.B	204
Aerospace Engineering	Technology	B.A.E.M.	265
Afro-American and African Studies	Liberal Arts	B.A.	155
Agricultural and Food Business Management	Agricultural, Food, and Environmental Sciences	B.S.	45
Agricultural Education	Agricultural, Food, and Environmental Sciences/ Education and Human Development	B.S.	47 117
Agricultural Industries and Marketing	Agricultural, Food, and Environmental Sciences	B.S.	50
American Indian Studies	Liberal Arts	B.A.	155
American Studies	Liberal Arts	B.A.	156
Ancient Near Eastern Studies	Liberal Arts	B.A.	156
Animal Production Systems	Agricultural, Food, and Environmental Sciences	B.S.	51
Animal Science	Agricultural, Food, and Environmental Sciences	Minor only	52
Anthropology	Liberal Arts	B.A.	156
Applied Business	Continuing Education	B.A.S.	102
Applied Economics	Agricultural, Food, and Environmental Sciences	B.S.	52
Architecture	Architecture and Landscape Architecture	B.S.	70
	Liberal Arts	B.A.	157
Art	Liberal Arts	B.A., B.F.A.	158
Art History	Liberal Arts	B.A.	159
Astronomy	Liberal Arts	B.A.	160
Astrophysics	Technology	B.S.Astro.P.	266
Biblical Studies	Liberal Arts	Minor only	160
Biochemistry	Biological Sciences	B.S.	86
Biology	Liberal Arts	B.A.	160
	Biological Sciences	B.S.	86
Biomedical Engineering	Technology	B.Bm.E.	267
Biosystems and Agricultural Engineering	Technology	B.B.A.E	268
Business and Industry Education	Education and Human Development	B.S.	120
Chemical Engineering	Technology	B.Ch.E.	269
Chemistry	Liberal Arts	B.A.	161
	Technology	B.S.Chem.	271
Chicano Studies	Liberal Arts	B.A.	162
Child Psychology	Liberal Arts	B.A., B.S.	162
Chinese	Liberal Arts	B.A.	163
Civil Engineering	Technology	B.C.E.	272
Classical and Near Eastern Archaeology	Liberal Arts	B.A.	163
Classical Civilization	Liberal Arts	B.A.	164
Climatology	Agricultural, Food, and Environmental Sciences	Minor only	53
Clothing Design	Human Ecology	B.S.	139
Coaching	Education and Human Development	Minor only	121
Computer Engineering	Technology	B.Comp.Eng.	273
Computer Science	Liberal Arts	B.A.	164
	Technology	B.S.Comp.Sc.	274
Construction Management	Continuing Education	B.A.S.	102
Crops and Soils Resources Management	Agricultural, Food, and Environmental Sciences	B.S.	53
Cultural Studies and Comparative Literature	Liberal Arts	B.A.	165
Dance	Liberal Arts	B.A., B.F.A.	165
Dental Hygiene	Dentistry	B.S.	110
Design	Human Ecology	Minor only	144
Dutch Studies	Liberal Arts	Minor only	166
East Asian Studies	Liberal Arts	Minor only	166
Ecology, Evolution, and Behavior	Biological Sciences	B.S.	87
Economics	Liberal Arts	B.A., B.S., B.A.Quant.	166
Electrical Engineering	Technology	B.E.E.	275
Emergency Health Services	Continuing Education	B.A.S.	103
English	Liberal Arts	B.A.	168
Entomology	Agricultural, Food, and Environmental Sciences	Minor only	54

<i>Degree Program</i>	<i>College/School</i>	<i>Degree</i>	<i>Page</i>
Environmental Design	Architecture and Landscape Architecture	B.E.D.	71
Environmental Horticulture	Agricultural, Food, and Environmental Sciences	B.S.	54
Environmental Science	Agricultural, Food, and Environmental Sciences	B.S.	55
European Area Studies	Liberal Arts	Minor only	169
Family Social Science	Human Ecology	B.S.	139
Film Studies	Liberal Arts	B.A.	169
Finance	Management	B.S.B.	205
Fisheries and Wildlife	Natural Resources	B.S.	228
Food Science	Agricultural, Food, and Environmental Sciences	B.S.	57
	Human Ecology		140
Foreign Studies	Liberal Arts	Minor only	169
Forest Resources	Natural Resources	B.S.	231
Foundations of Education	Education and Human Development	B.S.	122
French Studies	Liberal Arts	B.A.	170
French and Italian Studies	Liberal Arts	B.A.	170
General Management	Management	B.S.B.	205
General Management—Entrepreneurial Studies	Management	B.S.B.	205
Genetics, Cell Biology, and Development	Biological Sciences	B.S.	88
Geography	Liberal Arts	B.A., B.S.	170
Geological Engineering	Technology	B.Geo.E.	277
Geology	Liberal Arts	B.A.	171
	Technology	B.S.Geol.	278
Geophysics	Technology	B.S.Geophys.	279
German Studies	Liberal Arts	B.A.	172
Global Studies	Liberal Arts	B.A.	173
Graphic Design	Human Ecology	B.S.	140
Greek	Liberal Arts	B.A.	173
Hebrew	Liberal Arts	B.A.	174
History	Liberal Arts	B.A.	174
History of Medicine	Liberal Arts	Minor only	175
History of Science and Technology	Liberal Arts	Minor only	175
Housing Studies	Human Ecology	B.S.	141
Human Resource Development	Education and Human Development	B.S.	122
Human Resources and Industrial Relations	Management	B.S.B.	206
Humanities in the West	Liberal Arts	Minor only	175
Individualized Studies	Liberal Arts	B.I.S.	175
Individually Designed Interdepartmental Major	Liberal Arts	B.A.	176
Information Networking	Continuing Education	B.A.S.	103
Information Technology	Technology	Minor only	280
Institute of Technology Management Minor	Management	Minor only	207
	Technology		281
Integrated Pest Management Cropping Systems	Agricultural, Food, and Environmental Sciences	Minor only	57
Inter-College Program (ICP)	Continuing Education	B.A., B.S.	97
Interior Design	Human Ecology	B.S.	142
International Agriculture	Agricultural, Food, and Environmental Sciences	Minor only	57
International Business	Management	B.S.B.	206
Italian Studies	Liberal Arts	B.A.	176
Japanese	Liberal Arts	B.A.	177
Jewish Studies	Liberal Arts	B.A.	177
Journalism and Mass Communication	Liberal Arts	B.A.	178
Kinesiology	Education and Human Development	B.S.	123
Latin	Liberal Arts	B.A.	179
Latin American Studies	Liberal Arts	Minor only	180
Linguistics	Liberal Arts	B.A.	180
Management Information Systems	Management	B.S.B.	206
Marketing	Management	B.S.B.	207
Materials Science and Engineering	Technology	B.Mat.S.E.	281

<i>Degree Program</i>	<i>College/School</i>	<i>Degree</i>	<i>Page</i>
Mathematics	Liberal Arts	B.A.	180
	Technology	B.S.Math.	282
Mechanical Engineering	Technology	B.M.E.	283
Medical Technology	Medical	B.S.	215
Medieval Studies	Liberal Arts	Minor only	181
Microbiology	Liberal Arts	B.A.	181
	Biological Sciences	B.S.	88
Mortuary Science	Medical	B.S.	220
Music	Liberal Arts	B.A.	182
Music Education	Liberal Arts	B.M.	182
Music Therapy	Liberal Arts	B.M.	183
Music-Jazz Studies	Liberal Arts	B.M.	184
Music-Performance	Liberal Arts	B.M.	184
Natural Resources and Environmental Studies	Natural Resources	B.S.	233
Network Administration	Continuing Education	B.A.S.	104
Neuroscience	Biological Sciences	B.S.	89
Nursing	Nursing	B.S.N.	248
Nutrition	Agricultural, Food, and Environmental Sciences	B.S.	58
	Human Ecology		142
Philosophy	Liberal Arts	B.A.	185
Physics	Liberal Arts	B.A.	185
	Technology	B.S.Phys.	285
Physiology	Liberal Arts	B.A.	186
Plant Biology	Biological Sciences	B.S.	90
Political Science	Liberal Arts	B.A.	186
Program for Individualized Learning (PIL)	Continuing Education	B.A., B.S.	99
Psychology	Liberal Arts	B.A.	187
Recreation, Park, and Leisure Studies	Education and Human Development	B.S.	124
Recreation Resource Management	Natural Resources	B.S.	237
Religious Studies	Liberal Arts	B.A.	187
Retail Merchandising	Human Ecology	B.S.	144
Risk Management and Insurance	Management	B.S.B.	207
Russian	Liberal Arts	B.A.	188
Russian Area Studies	Liberal Arts	Minor only	188
Scandinavian Languages and Finnish	Liberal Arts	B.A.	188
Science in Agriculture	Agricultural, Food, and Environmental Sciences	B.S.	59
Scientific and Technical Communication	Agricultural, Food, and Environmental Sciences	B.S.	60
Sociology	Liberal Arts	B.A., B.S.	189
Soil Science	Agricultural, Food, and Environmental Sciences	Minor only	63
South Asian and Middle Eastern Area Studies	Liberal Arts	Minor only	190
Spanish Studies	Liberal Arts	B.A.	190
Spanish-Portuguese Studies	Liberal Arts	B.A.	191
Speech and Hearing Science	Liberal Arts	B.A.	191
Speech-Communication	Liberal Arts	B.A.	192
Sport Studies	Education and Human Development	B.S.	125
Statistics	Liberal Arts	B.A.	192
	Technology	B.S.Stat.	286
Sustainable Agriculture	Agricultural, Food, and Environmental Sciences	Minor only	63
Theatre Arts	Liberal Arts	B.A.	193
Undergraduate Leadership Minor	Education and Human Development	Minor only	126
Urban Forestry	Natural Resources	B.S.	238
Urban Studies	Liberal Arts	B.A., B.S.	193
Water Science	Agricultural, Food, and Environmental Sciences	Minor only	63
Women's Studies	Liberal Arts	B.A.	194
Wood and Paper Science	Natural Resources	B.S.	239

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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 161 bachelor's degrees, 218 master's degrees, 114 doctoral degrees, and 5 professional degrees. 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, Rochester University College Center, 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 will celebrate 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 has been accredited by the North Central Association of Colleges and Schools, Commission on Institutions of Higher Education, since 1913, when the Commission's first list of accredited institutions was published. The last official Commission action occurred in October 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. The 1996 self-study report and the site visit team report are available at <www.irr.umn.edu/accred/>. For more information, call the Commission at 1-800-621-7440 or view their Web site <www.ncacihe.org>. The Twin Cities campus also includes more than 50 academic programs and collegiate units that are accredited separately by various professional and disciplinary associations.



In 1851, the
Minnesota territorial
legislature and
Governor Alexander
Ramsey chartered
the University of
Minnesota and
elected a board of
regents, seven years
before Minnesota
became a state.

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 <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, 120 Biosystems & Ag. Eng. Bldg., 624-7254

College of Architecture and Landscape Architecture
College Office, 110 Architecture, 626-1000

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

College of Continuing Education
Student Support Services, 150 Wesbrook Hall, 625-3333
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, 32 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 Admin. Bldg., 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 and on the Web <www.umn.edu/cic>.

Find it

To find a major or minor and its corresponding college, use the Directory of Undergraduate Programs on pages 4–6 or the index at the back of this catalog.

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.

First-year students are given an opportunity to participate in the **Four-Year Graduation Plan**. Those who participate agree to make full-time progress toward their degree. In return, the University agrees to see that these students do not experience a delay in their four-year graduation schedule due to lack of course access.

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 <onestop.umn.edu/Employment>.

Career planning takes time. Students should plan to begin this process early in their University experience.

(area code 612)

College of Agricultural, Food, and Environmental Sciences

Career Services, 120 Biosystems and Agricultural Engineering Bldg, 624-2710

College of Architecture and Landscape Architecture

College Office, 110 Architecture Building, 626-1000

College of Biological Sciences

Career Center, 213 Snyder Hall, 624-9270

College of Continuing Education

Student Support Services, 150 Westbrook Hall, 625-3333

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, 68 McNeal Hall, 624-6762

College of Liberal Arts

Special Learning Opportunities/Career and Internship Services, 220 Johnston Hall, 624-7577

Participation in the plan does not guarantee graduation in four years if there are major changes in a student's academic plans. Students not participating in the plan can also graduate in four years with careful planning. For more information, see 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 <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.



Warren Clark Eustis
and Henry Martyn
Williamson were the
first University
graduates in 1873. In
1875, Helen Mar Ely
became the first
woman to graduate.

Carlson School of Management

Career Services, 1-110 Carlson School of Management, 624-0011

College of Natural Resources

Career Services, 135 Natural Resources Administration Bldg., 624-6768

Institute of Technology

Career Services, 50 Lind Hall, 624-4090

Campus-wide 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 Gateway Center, 626-8035
Access to Work, 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 (106A University Technology Center, June 1999)

Chicano/Latino Learning Resource Center

315 Science Classroom Building, 625-6013

Disability Services

180 Gateway 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

<www.writinghelp.umn.edu>

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

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
- Norris Hall (East Bank)—science and engineering
- 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 and hours.

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 190 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 visiting one of the computer help labs:

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
50 Humphrey Center, Mon.-Fri., 1 p.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.

Special Learning Opportunities

The Office for Special Learning Opportunities (OSLO) offers resources, workshops, and courses for students interested in internship, volunteer, career, or student exchange opportunities. The Career & Internship Services Program has connections with thousands of internship and job opportunities. Career counselors are available. Through Community Involvement Programs, hundreds of volunteer opportunities are also available. OSLO’s National Student Exchange Program offers students the opportunity to study at one of more than 160 public colleges and universities in the United States, Puerto Rico, the Virgin Islands, Guam, and Canada.

Find it

Construction, remodeling, and renovation is happening all over campus. Find out what’s going on at <www.facm.umn.edu/facm/construction.htm>.

Libraries

Housed in six major facilities and nine branch sites, the University Libraries system includes more than 5.4 million print volumes, 45,000 serial subscriptions, 5.7 million microforms, 2.7 million government documents, and 402,000 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 library, serving Minnesota and South Dakota, 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 full-text periodicals, academic journal articles, and newspapers to its databases. Students can access both LUMINA and MNCAT from library computer terminals or from any computer through the University Libraries’ Web site <www.lib.umn.edu>.

Students can study for one term or an entire academic year. For more information about these programs and other special learning opportunities, check <www.oslo.umn.edu>, call 612-624-7577, or visit 220 Johnston Hall. Also see the College of Liberal Arts section of this catalog for more information on OSLO's services.

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 170 study abroad options in 60 countries are available to University undergraduates through the Global Campus in the Office of International Programs. Students in every major are strongly encouraged to spend part of their undergraduate career earning credit through a study abroad experience.

A World of Options—Programs offered by the Global Campus vary in focus and discipline, and include language, theme, area studies, integrated classroom, internships, and field study opportunities. Programs are often offered in collaboration with academic departments and on-site foreign institutions, and many have been evaluated to meet the University's liberal education requirements. Students may choose from academic year, semester, quarter, short terms, and summer terms. A variety of programs in English are available. Some programs offer credit-bearing internships in addition to classroom coursework.

Study abroad students earn University or transfer credit that appears on their transcript. Students also may explore outside options for which the Global Campus will facilitate credit.

Studying Abroad in a Major—Virtually every topic of study is represented in study abroad. Students in any field – from accounting to engineering, international relations to zoology – can make progress toward their degree requirements while overseas. The Global Campus is working with University colleges and departments to develop a list of especially good 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 related coursework focusing on a country or region of study, intercultural communication, and language study. See the College of Liberal Arts section of this catalog or contact the Global Campus office.

Scholarships and Other Financial Resources—In addition to the Global Campus scholarship fund of \$50,000, a new University-wide scholarship fund of \$100,000 is available to students studying abroad. Students may apply most regular financial aid to study abroad, and additional scholarships and travel grants are available. 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 related to cultural encounters, community service, and a year-end activity. SAAS also offers a mentoring program, which pairs return study abroad students with students preparing to study abroad. For more information, visit the SAAS Web site <www.tc.umn.edu/~saas>.

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>.



The University's first permanent building, Old Main, was erected in 1858. As the campus grew, this area became known as the knoll. In the 19th and early 20th centuries, the knoll was the University's front yard.



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 **<admissions.tc.umn.edu>**

Campus Visits and Tours

To make visit reservations, call the Office of Admissions **VISITLINE** at 612-625-2008 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

Application deadlines and admission policies and procedures are subject to change. For current information, contact the Office of Admissions.

How to Apply—Prospective freshmen and transfer students may obtain application materials on the World Wide Web at <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 transcripts for any college work attempted, the ACT or SAT test score report, 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) 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 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 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 confirmation fee. The deadline for payment of the confirmation fee will be indicated on the *Intent to Enroll* 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 will receive letters and information from their college of admission, including an invitation for **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

Below 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.

Find it

Tuition and fees and registration information vary from semester to semester. Check the current *Class Schedule* at <<http://onestop.umn.edu/Courses/schedule.html>> for the most up-to-date information.

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 in a post-secondary institution after high school at the time of application 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 reviews each application to determine the applicant's potential for academic success.

Specifically, the Office of Admissions will review:

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

All of these factors will be considered routinely as part of the admission process to determine an applicant's admissibility. Freshmen who do not meet the standard admission profile for automatic admission will be considered on an **individual review** basis, a routine part of the admission process.

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 English¹, with emphasis on writing, including instruction in reading and speaking skills and in literary understanding and appreciation;
- three years of mathematics², including one year each of elementary algebra, geometry, and intermediate algebra;
- three years of science², 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 do not complete the high school course preparation requirements may sometimes be admitted if they have promising academic records and meet other entrance requirements, but they are expected to make up any deficiencies by end of the first year of enrollment on the Twin Cities campus.

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.

Find it



A series of tunnels
and skyways called
"The Gopher Way"
connects many
University buildings.
Many signs and maps
are in place to help
you find your way.

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 regionally accredited 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 15.

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 to meet special personal needs 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 or Status* to the Office of the Registrar (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 <onestop.umn.edu/Registrar/change_college.html>.

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, Office of Special Learning Opportunities, 220 Johnston Hall, 101 Pleasant Street S.E., Minneapolis, MN 55455, (612-624-7577).

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.

The University of Minnesota graduates more than 10,000 students per year in 250 different degree programs. The Twin Cities campus offers more than 150 bachelor's degree 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—two semesters per academic year—and credits awarded are *semester credits*. Quarter credits from other U.S. institutions are usually converted to semester credits by multiplying the number of quarter credits by 2/3. For example, 3 quarter credits equal 2 semester credits.

Residence Requirement for Graduation—To complete a degree at the University, a student must take 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.

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 repeats a course in which the initial grade was D+ or lower, the most recent grade and credits transfer to the University. When a student repeats a course in which the initial grade was C- or higher, only the initial grade and credits transfer to the University.

- The minimum grade required for transfer is D. Individual colleges and programs determine how the course may be used to meet degree requirements. All programs require a C- or better in each course in the major.
- 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 by the Office of Admissions.
- 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.

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.

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.



The opening of
Coffman Union in
1940 fulfilled a long-
standing need for a
campus student
center. Coffman
closed for renovation
in November 1999
and is scheduled
to reopen in the fall
of 2001.



Find it



For information on orientation to the University, contact New Student Programs, 720 Washington Ave. S.E., 612-624-0666, e-mail: nsp@tc.umn.edu.

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 (MTC). Students who complete the MTC 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. MTC completion must be noted on the official transcript. An A.S. degree will be evaluated for the LE requirements on a course-by-course basis.

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 612-625-3333.

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.

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 transcribed 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 if they are not satisfied. See “Rights as a Transfer Student” below.

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.

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

Undergraduate Colleges

Below is a synopsis of each undergraduate college or program, with a general description of their admission policies. For details about their degree programs, requirements, and services, see the college and program sections of this catalog.

Agricultural, Food, and Environmental Sciences

The College of Agricultural, Food, and Environmental Sciences (COAFES) offers nationally ranked programs including agronomy, animal science, biotechnology, business, communications, economics, education, environment, food, horticulture, marketing, nutrition, plants, science, soils, technical communication, and pre-veterinary medicine. Graduates are employed in a complex industry that provides 20 percent of the country's gross national product, or they enter graduate or veterinary medicine programs.

Admission: Admits freshmen and transfers.

Architecture and Landscape Architecture

The College of Architecture and Landscape Architecture (CALA) offers a B.S. Arch. and a B.A. in conjunction with the College of Liberal Arts, which provides students a broad-based education focused on the meaning and experience of people's physical settings. CALA also offers a bachelor of environmental design (B.E.D.), which enables students to explore a broad range of ecologically oriented courses and complete one year of professional coursework in landscape architecture.

Admission: See the CALA college section of this catalog.

Biological Sciences

The College of Biological Sciences (CBS) offers majors in biology; biochemistry; ecology, evolution, and behavior; genetics and cell biology; microbiology; neuroscience; and plant biology. More than half of CBS graduates pursue graduate work in the biological sciences or in professional programs in medicine, dentistry, and veterinary medicine; the rest pursue entry-level employment in research laboratories, biomedical and biotechnology companies, environmental consulting firms, and other agencies.

Admission: Two entry tracks: 1) admission for outstanding freshman applicants or 2) transfer admission following completion of one to two years of biology undergraduate work (including courses in calculus and chemistry) with a competitive GPA.

College of Continuing Education

The College of Continuing Education (CCE) offers courses and programs for adult, part-time, and non-traditional learners, including evening classes, independent and distance education as well as some weekend courses. Bachelor's degrees available include five practitioner-oriented programs designed for the working adult as well as two self-designed programs, the Inter-College Program (ICP) and Program for Individualized Learning (PIL). These self-designed programs serve highly motivated, creative, and self-directed students who seek independence and flexibility in structuring their degree programs. In addition, CCE offers 20 certificate programs and numerous non-credits courses.

Admission: All CCE degree programs require applicants to complete a certain amount of college credit before admission. In addition, ICP and PIL programs require completion of a narrative application outlining degree plans and educational goals.

Dental Hygiene

The dental hygiene program was established at the University in 1919 and is fully accredited by the Commission on Dental Accreditation. It is the only dental hygiene program in Minnesota that grants a bachelor of science degree and is affiliated with a school of dentistry. The program blends a solid dental hygiene clinical education with the biological, behavioral, and social sciences and the liberal arts.

Admission: One year of specified college courses with a minimum 2.00 cumulative, preprofessional, and science GPA and a grade of C or better in all preprofessional coursework. Biology or chemistry, composition, and psychology or sociology must be completed so that grades are on the transcript at the time of application.

Education and Human Development

The College of Education and Human Development ranks among the top educational research and development centers in the nation. The college offers both undergraduate and advanced study programs in a wide range of disciplines. Students can prepare for careers in government, business, or community settings as well as careers in education in either formal or non-formal settings.

Admission: One to two years of specified college courses, depending on major. Most teaching licensure programs in the college require a bachelor's degree for admission. An early admission program is available for students who wish to teach at the secondary level.

General College

General College (GC) offers access to the University for students who demonstrate academic potential and seek opportunities to develop this potential in a challenging and innovative educational environment. GC offers a strong foundation of college coursework in a supportive learning environment to help a diverse population of students overcome obstacles to their educational success and prepare for successful transfer to and completion of degree programs in other University of Minnesota colleges.

Admission: High school graduation or equivalent. The college does not admit students who have completed more than 25 semester credits of college work.

Human Ecology

Students in the College of Human Ecology are empowered to work effectively and creatively to improve the human condition. The college offers programs in clothing design, family social science, food science, graphic design, housing studies, interior design, nutrition, and retail merchandising. Graduates work in areas such as human services, interior design, graphic design production, nutrition, retail management, clothing design, food science, and housing-related professions such as city planning, site inspection, and consumer advocacy.

Admission: Admits freshmen and transfers. Most entering first-year students are in the top quarter of their class. All incoming students must complete three years of high school math including algebra, geometry, and intermediate algebra. Transfer students need a minimum GPA of 2.50 for consideration.

Liberal Arts

The College of Liberal Arts (CLA) encompasses the basic disciplines of knowledge. The social sciences, humanities, fine arts, and natural sciences are represented by more than 60 major fields of study and interdisciplinary programs (see the CLA section of this catalog). Many CLA departments rank among the top in the country.

Admission: Admits freshmen and transfers. Competitive. Most entering freshmen are in the top quarter of their class. In addition to completing regular University preparation requirements, prospective CLA students are encouraged to complete a third or fourth year of second language study. Admission to some programs requires a special application or audition. Transfer applicants are considered for admission based on available space, choice of major, cumulative grade point average for previous college courses, recent grade trends, and, for students with less than 26 transferable credits, high school grades and test scores. Admission after priority deadlines is subject to availability of space.

Management (Carlson School)

The Curtis L. Carlson School of Management offers outstanding undergraduate programs in accounting and management, with specializations in areas ranging from finance to marketing. Because the school maintains strong links with the Twin Cities business community, graduates of the school are considered an important source of new talent, and many students complete internships in local businesses.

Admission: Two entry tracks: 1) admission for outstanding freshman applicants or 2) transfer admission following completion of one to two years of undergraduate work with a competitive GPA.

Medical Technology

The bachelor's degree program in medical technology includes liberal arts education and a thorough grounding in the physical sciences as well as clinical experiences in various laboratories. Its association with the esteemed University of Minnesota Medical School and its outstanding facilities and faculty has established a strong reputation for the program.

Admission: Completion of two years (60 semester credits) of preprofessional and liberal arts coursework with a GPA of 2.50 or better.

Mortuary Science

Established in 1908, the program in mortuary science was the first program of its kind in the state. Students combine coursework in the basic and behavioral sciences and training in the mortuary arts and sciences with instruction in the liberal arts.

Admission: 60 semester credits of specified preprofessional coursework with grades of A, B, C, or S and a 2.50 cumulative GPA.

Natural Resources

One of the top colleges of its kind in the country, the College of Natural Resources offers programs in fisheries, wildlife, conservation biology, wood and paper science, forest resources, natural resources and environmental studies, recreation resource management, and urban forestry. Students receive individualized education and complete internships and fieldwork in preparation for careers that are critical to this country's environmental well-being and economic growth.

Admission: Admits freshmen and transfers. Minimum GPA for transfer admission is 2.00.

Nursing

Established in 1909 as the first nursing school on a university campus in the United States, the School of Nursing is now recognized as one of the best in the field. Continuing its distinguished tradition of preparing leaders in the profession of nursing, the school offers the bachelor of science in nursing as a foundation for professional practice and graduate study.

Admission: Competitive. At least 60 semester credits of pre-nursing coursework with a minimum GPA of 2.80 for prerequisite courses. Admission based on scholastic achievement and a written profile statement.

Technology (Institute of)

The Institute of Technology (IT) offers more than 20 bachelor's degree programs, including several engineering specialties, mathematics, physical sciences, computer science, and statistics. Admission to IT is selective; to be successful, students generally should have strong science and mathematics aptitude. More than 150 companies recruit in IT each year, and long-range career opportunities are good in most fields. Dual degree programs are offered jointly with several private colleges.

Admission: Very competitive. For freshman admission, IT requires four years of mathematics (one year more than the general University requirement), including geometry in two and three dimensions and trigonometry; and, as part of the science requirement, math-based high school physics and chemistry. GPA requirements for upper division programs vary by major.



The first building on the St. Paul campus was the Farm House (1884-1942). Built by F.D. Porter, it served as a residence, with offices as labs for the experiment station. Later it housed the Department of Agronomy.



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 <onestop.umn.edu/Courses/schedule.html>.

Most students register via the Web<onestop.umn.edu/Enrollment/>; others complete a credit enrollment request form and take it to the Registration Center in 200 Fraser Hall, 130 West Bank Union 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.
- 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 <onestop.umn.edu/Finances/tuition_and_fees.html>.

Financial Aid

The Office of Scholarships and Financial Aid (OSFA) provides year-round assistance to help students through the financial aid application process. In addition to walk-in and telephone counseling, OSFA has computers available for online access and provides a range of published information at the Student Services Center, 200 Fraser Hall, and at their Web site <onestop.umn.edu/FinancialAid/>. The information includes estimates of costs to attend the University and describes the types of financial aid that might be available to help students meet those costs. Estimates are based on anticipated state funding for the University and cost of living averages for the Twin Cities metropolitan area at the time of publication. Actual costs will depend on where students live, their transportation, and other lifestyle choices.

Additional scholarship funds from University departments may be available to students, depending on their major and their academic record. 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.

OSFA also distributes the *Scholarships & Financial Aid Handbook*, which includes the Free Application for Federal Student Aid (FAFSA). The handbook provides comprehensive information to help students during the financial aid process. It is available at 200 Fraser Hall, 130 West Bank Union Skyway, 130 Coffey Hall, Minnesota Bookstores, St. Paul Student Center, University libraries, residence halls, and college advising offices. A directory in the handbook lists offices both on

and off campus that provide assistance and information during the aid process. In addition, the *Scholarships & Financial Aid News*, a newsletter distributed on campus and the Internet, has timely reminders and updates on financial aid.

Students must reapply for financial aid each year. After their first year, they should receive a Renewal FAFSA from the federal government, which asks them to update and add any necessary new information. Continuing students should apply for financial aid by the priority deadline of March 1 in order 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 from OSFA. The form asks students to identify all postsecondary or college credit earned as a high school student and to provide a copy of academic transcript(s) with the terms highlighted in which they were a PSEO student. OSFA will deduct these high school quarters or semesters of attendance from students' accumulated state grant eligibility.

Visit, Call, or Write OSFA

Financial aid services are available at two campus locations. Full services are provided at the 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–Wednesday; 9:00 a.m.–5:30 p.m., Thursday; and 8:00 a.m.–4:00 p.m., Friday. Financial aid counselors are available by telephone at 612-624-1665 (8 a.m.–4 p.m., Mon.–Wed., Friday and 9 a.m.–4 p.m., Thursday) or in person, walk-in, or by appointment. Counselors will discuss student concerns, answer questions, review applications or other forms for completeness, and direct students to any additional forms or application materials needed. In addition, a self-service computer area allows students to conduct online scholarship searches, file a FAFSA application, or review their records on Student Access Screens. Students on the St. Paul campus may also go to the Student Services Center in 130 Coffey Hall, 1420 Eckles Avenue, to see financial aid counselors from 12:30 to 3:00 p.m., Monday, Wednesday, and Thursday.

Send correspondence to:

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 deaf/hard-of-hearing callers)	612-626-0701
Fax	612-624-9584
E-mail	osfa@tc.umn.edu
Web site	<onestop.umn.edu/FinancialAid/>

Managing Finances

A good place for students to start planning their college finances is the University's "Student finances" Web site <onestop.umn.edu/Finances/>. This site includes links to information about tuition and fees, financial aid, and student loans. It also includes a link to information about the U Card, which is a student's photo identification and University library card with banking and calling features. The site also includes access to a student's records. For more information about student accounts, contact Student Accounts Receivable, 200 Fraser Hall (612-625-8500).

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 <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.

Campus Involvement Center—The Campus Involvement Center, 720 Washington Ave. S.E., Room 11, (612-626-6919), offers various programming initiatives and learning opportunities, including the events calendar Web site <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 center's Web site <www.umn.edu/cic>.

Housing & Residential Life—The University has 10 housing facilities on campus serving about 5,500 students: eight residence halls (six on the East Bank, one on the West Bank, and one on the St. Paul campus) and two apartment-style complexes (both on the East Bank). The Housing & Residential Life office (in Comstock Hall-East, 612-624-2994) also has information about low-cost 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—The men's program offers baseball, basketball, cross country, football, golf, gymnastics, hockey, swimming and diving, tennis, track and field, and wrestling. For information, call 612-625-4838. The women's program offers basketball, cross country, golf, gymnastics, hockey, rowing, soccer, softball, swimming and diving, tennis, track and field, and volleyball. For information, call 612-624-8000.

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. All jobs are posted at the Job Center, 170 Donhowe Building. Students can view job opportunities on the Web <www.umn.edu/ohr/jobs/students.html> and contact employers directly. Work-Study positions are available.

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 more than 30 clubs in a wide variety of competitive and instructional sport activities. The Intramural Program offers nearly 500 leagues and tournaments in 15 sports. The 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 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, a bookstore, and an outdoor gear specialty shop. The unions also sponsor numerous events and activities for the campus community.

Note: Coffman Memorial Union is closed for renovation through fall 2001. 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.



Land on the west bank of the river was acquired by the University in 1954, but building didn't start until the early 1960s. Modern towers and a four-story classroom building were the first to be completed.



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
- Every day, 7:30 a.m.-8:30 p.m.

Campus events <events.tc.umn.edu>

- Campus Involvement Center 626-6919
- Coffman Memorial Union 625-2272
- St. Paul Student Center Union Station 625-9794

University of Minnesota Alumni Association

200 Gateway Center
624-2323

University of Minnesota Police Department

511 Washington Avenue S.
Non-emergency 624-3550
Emergency 911

Admissions

Change of college

200 Fraser Hall 625-5333

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
Monday, 8:00 a.m.–6:00 p.m.
Tuesday–Friday, 8:00 a.m.–4:30 p.m.

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

Microcomputer Helpline 626-4276

- 152 Shepherd Labs
- 50 Hubert H. Humphrey Center
- 58 Biological Sciences

Copying services

Copies on Campus

- East Bank, 101 Norris Hall 625-3971
- East Bank, B-1 Johnston Hall 625-1092
- East Bank, 147 Smith Hall 625-4390
- East Bank, 130 Gateway Center 624-7531
- Health Sciences, D-104 Mayo Memorial Building 625-8914
- St. Paul, 8 St. Paul Student Center 625-4771
- West Bank, 33 Social Sciences Building 625-9047
- West Bank, 40 West Bank Office Building 626-9225

Counseling and Other 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., 2nd floor
626-1055

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 Gateway Center 626-1333
(voice or TDD)

Equal Opportunity Office

419 Morrill Hall 624-9547

Gay, Lesbian, Bisexual, Transgender Programs Office

138 Klaeber Court 626-2324

International Student and Scholar Services

190 Hubert H. Humphrey Center 626-7100

Learning and Academic Skills Center

109 Eddy Hall 624-3323

Mental Health Clinic

N400 Boynton Health Service 624-1444

Minnesota Women's Center

112 Klaeber Court 625-9837

Program Against Sexual Violence

24-Hour Crisis Line 626-9111

407 Boynton Health Service 626-2929

Student Dispute Resolution Center

107 Eddy Hall 625-5900

Student/Parent HELP Center

133/180 Appleby Hall 625-5307

University Counseling & Consulting Services

- 109 Eddy Hall 624-3323
- 130 Coffey Hall 624-3731

University of Minnesota Alumni Association

200 Gateway Center 624-2323

Urgent Mental Health Consultation

Boynton Health Service 625-8475

Employment

Student Employment

U of M Job Center

170 Donhowe Building
319 15th Avenue S.E.
625-8003

Graduate Assistant Office

170 Donhowe Building
319 15th Avenue S.E.
624-7070

Entertainment/Arts

Bell Museum

624-7083

Coffman Memorial Union program information

625-2272

Events calendar

<events.tc.umn.edu>

Frederick R. Weisman Art Museum

625-9494

Goldstein Museum

624-7434

Nash Gallery

624-7530

Northrop Auditorium arts ticket office

624-2345

School of Music events hotline

Ted Mann Concert Hall
626-8742

University Film Society hotline

627-4430

University Theatre

120 Rarig Center 625-4001

Financial Aid

Scholarships and Financial Aid, Office of

200 Fraser Hall 624-1665

130 Coffey Hall 624-1665

Student Loan Collections

140 Williamson Hall 625-8007

Health and Public Services

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 Counseling 379-6363 or 625-7900

Dental School Clinic
Seventh floor, Moos Tower 625-2495

Program Against Sexual Violence
24-hour crisis line 626-9111
407 Boynton Health Service 626-2929

University Hospital emergency receiving
Second floor, Unit J 626-2700
(nights and weekends)

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

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 624-2929
- 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
230 Heller Hall 626-9000

Office of International Programs
645 Heller Hall 624-5580

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

International Study and Travel Center
94 Blegen Hall 626-4782

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

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

Science and Engineering Library
Norris Hall 624-3366

Library Learning Resource Centers

- **Bio-Medical Library**
270 Diehl Hall 626-4045
- **East Bank**
153 Norris Hall 624-1584
- **St. Paul**
Magrath Library 624-2233

University Archives
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 Gateway Center 624-8628

Check cashing

- 145 Williamson Hall 625-7535
Monday-Friday 8:00 a.m.–3:30 p.m.
- 101A Anderson Hall 625-1383
Tuesday and Thursday
8:00 a.m.–3:30 p.m.
- 107 Coffey Hall 625-8108
Monday, Wednesday, Friday
8:00 a.m.–3:30 p.m.
- West Bank Skyway 624-6338
- St. Paul Student Center 625-9794
Information desk
Monday-Friday 8:00 a.m.–5:00 p.m.

Child care

- **Child Care Center, University**
East Bank 627-4014
- **Community Child Care Commonwealth Terrace**
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 (Coffman Services)**
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 Service

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

Registration, Fee Payment, and Student Records

Fee payment, Bursar's Office

- 145 Williamson Hall, East Bank
625-7535
- 101A Anderson Hall, West Bank
625-1383
- 107 Coffey Hall, St. Paul
625-8108

Paid fee verification
200 Fraser Hall 625-8500

Registration Center

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

Study lists

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

Transcripts, records problems
Office of the Registrar

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

St. Paul Campus
Visitor information 624-3731

Bailey Hall
1458 N. Cleveland Avenue 624-0700

Bursar's Office: cashier, check cashing
107 Coffey Hall 625-8108

Outdoor Store
St. Paul Student Center 625-8790

Recreational Sports
104 St. Paul Gym 625-8283

**Office of the Registrar—
Student Services Center**
130 Coffey Hall 624-3731

Student union activities/events
625-9794

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

Metro transit (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 349-7000
Motorist Assistance Program 625-5533

Find it

Locations of student organizations, cultural centers, services, and departments that have moved during the renovation of Coffman Memorial Union can be found at <http://www.coffman.umn.edu/renovations/relocation.html>.

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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. These policies are effective fall 1999 (or earlier if noted below). 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.

Absences

Students are expected to attend all meetings of their courses. They may be excused from class, however, to participate in religious observances and for approved University activities. 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 maintain satisfactory academic progress. 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 Registrar's Office Service Centers located in 200 Fraser Hall, 130 West Bank Skyway, or 130 Coffey Hall. 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 (see below).

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 <onestop.umn.edu/Registrar/sturec.html>, at 200 Fraser Hall, Minneapolis, and at records offices on other campuses of the University. Questions may be directed to the Office of the Registrar, 200 Fraser Hall (612-625-5333).

Students are responsible for updating their address information, which can be done online <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 or Status* to the Registrar (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 <onestop.umn.edu/Registrar/change_college.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*.

Find it

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 <onestop.umn.edu/Registrar/libed/requirements.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, 662 Heller Hall, 612-624-6073. The code is published regularly and also available on the Web at <www.sja.umn.edu>. See also **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.

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.

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).

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 who are planning to graduate in four years. A complete set of eligibility rules is listed in the information packet sent to all new freshmen and is on the Web <www.irr.umn.edu/fouryear/>.

Students on the plan must meet preparation requirements when they enter the University and must plan their program with the assistance of their adviser. Checkpoints have been set up for most degree programs to help students stay on track. Checkpoint course guides are available on the Web <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, 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.

Grading and Transcript Policy

The complete University Senate policy can be found on the Web <www.umn.edu/usenate/policies/gradingpolicy.html>.

1. The policy is effective fall quarter 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. The choice may not be changed after the end of the second week of classes (the first week in summer terms).
4. Instructors must clearly define for a class, at one of its earliest meetings, the performance necessary to earn each grade or symbol.

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 <i>extraordinary</i> 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 adult special 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 undergraduate 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. |

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. When a student repeats a course, all grades for the course appear on the transcript, but the course credits may not be counted more than once toward degree and program requirements.
9. Students may petition the college scholastic committee or other appropriate body about this policy.
10. The grades on page 29 (with grade points as indicated) and symbols are used on transcripts.

Graduation, Applying for

To graduate, students must submit an *Application for Degree* to the Office of the Registrar by the end of the second week of the semester of graduation.) For details, see the *Class Schedule*. See also the registrar's Web site <onestop.umn.edu/Registrar/Graduating/>.

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 take at least 30 semester credits on the Twin Cities campus of the University, including 24 credits taken after admission to the major or program and taken from the college offering the major or program.
- 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., after the completion of 60 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. For example, a student may wish to follow academic grievance procedures to appeal a final course grade. 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, 662 Heller Hall (612-624-6073).

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).

Honors

See **Graduation With Distinction or With Honors**. See also the college and program sections of this catalog.

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 Transcript Policy**.

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 <onestop.umn.edu/Registrar/libed/requirements.html>. 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 <onestop.umn.edu/Courses/schedule.html>.

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.

Located on the eastern edge of the Minneapolis campus, the new McNamara Alumni Center, University of Minnesota Gateway, serves as a welcoming center and gathering place for alumni, visitors, and donors, as well as students and their families.



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 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.

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 Transcript Policy**.

Residence Requirements for Graduation

See **Graduation Requirements**.

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 Office of the Registrar, 200 Fraser Hall, 130 West Bank Skyway, or 130 Coffey Hall.

Suspension

See **Probation**.

Transcripts

See **Grading and Transcript Policy** 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 change of registration information in the *Class Schedule*.

Withdrawal From the University

See **Leave of Absence**.

Many forms, including those for financial aid, change of college or major, and transcript requests, can be found online at <<http://onestop.umn.edu/Forms/index.html>>.

***Overview of Undergraduate
Structure and Requirements***



Colleges, Departments, and Degree Programs

The UofM Twin Cities Campus

When students are admitted to the University of Minnesota, Twin Cities campus, they are admitted to a particular college. Each college includes many different departments and programs which make up its core academic mission. The colleges and programs listed below offer all of the undergraduate majors and minors on the Twin Cities campus.

College and Program Information

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** 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 132 majors, 25 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.

While every effort has been made to ensure accuracy, the information in the *Undergraduate Catalog* is subject to change without notice. Please consult with department offices for up-to-date information.

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Find it

To find a major or minor and its corresponding college, use the Directory of Undergraduate Programs on pages 4-6 or the index at the back of this catalog.



Liberal Education Requirements

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 following requirements apply to students enrolling at the Twin Cities campus fall 1999 or later.

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 diversified core and designated theme 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.

Satisfying the Liberal Education Requirements

Students can satisfy liberal education requirements with a variety of courses; some satisfy several requirements at once. For example, some courses will satisfy both a diversified core requirement and a designated theme requirement; other courses will satisfy the requirements for each of two designated themes. Courses that have been approved to satisfy liberal education requirements are published in each *Class Schedule* and on the Web.

**Undergrad Structure
and Requirements**

Find it

Each semester, the *Class Schedule* publishes the liberal education requirements and lists courses that count toward them.

This information also is available on the Web at onestop.umn.edu/Registrar/libed/requirements.html.



College of Agricultural, Food, and Environmental Sciences

This is the College of Agricultural, Food, and Environmental Sciences section of the 2000-2002 University of Minnesota Undergraduate Catalog.

COAFES

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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 1998-99, more than 900 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.

COAFES is located on the St. Paul campus. The Minnesota Agricultural Experiment Station borders the campus and supports a comprehensive agricultural 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 Prospective Student Services, 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. (See High School Course Preparation on page 15.)

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 have

- passed intermediate algebra with a grade of at least C;
- have at least a C average in transfer coursework;
- demonstrated a solid foundation in math and science.

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 or Status 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 regular University admission deadlines.

Non-degree Seeking—Previously known as the "adult special" category, "non-degree seeking" admission is primarily for (1) students who are (a) pursuing coursework in COAFES departments, but not seeking a degree or (b) 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 (2) staff members in COAFES departments taking courses through the Regents Scholarship Program and (3) 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, CSRM, ScAg, AgEd	Seed producer/conditioner, Agronomist, Crop consultant, Farmer, Elevator/Co-op manager, Regulatory agent, Plant protection representative, Horticulturist, 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, CSRM, 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, CSRM, 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, CSRM, 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 and Nutrition; Rhetoric
Soil and water resources	BAE, CSRM, 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

*College of
Agricultural, Food, and
Environmental Sciences*

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
CSRM	.....	Crops and Soils Resources 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.

In a limited number of programs, COAFES also offers a master of agriculture: a professional, non-research oriented degree designed for those who seek post baccalaureate education to further advance their professional competence. For more information, contact COAFES Student Services, 120 Biosystems and Agricultural Engineering, 1390 Eckles Avenue, St. Paul, MN 55108.

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. Interested students should contact the Department of Horticultural Science or COAFES Student Services.

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

Crops and Soils Resources 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 form before completing the required coursework for the second major.

Minors

To receive a minor, students must have a GPA of 2.00 or higher 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. The honors program leads to the cum laude degree designations in all COAFES majors.

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

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.

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 Office of the Registrar—St. Paul, 130 Coffey Hall.

Use of Elective Credits—With the approval of an adviser and the Scholastic Standing Committee, students may request that some completed electives be omitted from the list of courses counted toward a degree. A maximum of 10 credits of electives may be withheld to raise a GPA, but only to satisfy the graduation requirement of a 2.00 GPA. When a course is withheld from the undergraduate record, it can be reinstated only by an examination for credit or by repeating the course.

COAFES students are not required to take courses in physical education or music.

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.

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.

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, 120 Biosystems and Agricultural Engineering, 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 APAS reports and updated transcripts from the COAFES Student Services office.

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

College of
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Petition Procedures

To request permission to depart from usual procedures, students must complete a petition form available at the COAFES Student Services Office, 120 Biosystems and Agricultural Engineering, or at the Office of the Registrar—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 Undergraduate Research Opportunities Program 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 Career Services Office, 120 Biosystems and Agricultural Engineering (612-624-2710).

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 4 credits for satisfactory completion of a PEP program. Students may enroll in two different PEP programs, for a total of 8 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, 120 Biosystems and Agricultural Engineering (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 120 Biosystems and Agricultural Engineering. 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, 120 Biosystems and Agricultural Engineering (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, 120 Biosystems and Agricultural Engineering, 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>.

Student 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 120 Biosystems and Agricultural Engineering.

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, 120 Biosystems and Agricultural Engineering.

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 fall 2001. For relocation information, call 612-624-4636, email renovation@coffman.umn.edu, or visit the website 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, 120 Biosystems and Agricultural Engineering.

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
- 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

College of
Agricultural, Food, and
Environmental Sciences

Find it

Advance, the COAFES
newsletter, gives
students an in-depth
and personal look at
the college. Find it at
<[www.agri.umn.edu/
advance/](http://www.agri.umn.edu/advance/)>.



Directory

(area code 612)

Mailing address

120 Biosystems and Agricultural Engineering
1390 Eckles Avenue
St. Paul, MN 55108
<www.agri.umn.edu>

COAFES services listed below are in 120 Biosystems and Agricultural Engineering unless otherwise noted.

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 624-2710

Student Services 624-7254

Includes:

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

Undergraduate Research Program (UROP) 624-2710

COAFES Administrative Offices

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

Associate Dean for Curricular and Student Affairs

Alan G. Hunter, 120 Biosystems and Agricultural Engineering,
624-4212

Following is a list of COAFES departments. Several departments and units also have formal affiliations or administrative links to other colleges: Agricultural Education has links with the College of Education and Human Development (CEHD); 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

R. Vance Morey, head
213 Agricultural Engineering
1390 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

Gary Gardner, 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

Billie J. Wahlstrom, head
202 Haecker Hall
1364 Eckles Avenue
St. Paul, MN 55108
624-7750

<www.rhetoric.umn.edu>

Affiliated majors

- Agricultural Industries and Marketing
- Scientific and Technical Communication

Soil, Water, and Climate

H. H. Cheng, 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

All Programs

COAFES views each of its majors as a four-year program that integrates liberal education courses, preparation or foundation courses, and professional courses in areas of special expertise. The following section details the requirements for each major. Several courses listed under the designation of foundation and professional courses in each major will also meet the liberal education requirements. Students need to consult with their adviser and a copy of the *Class Schedule* to determine what University courses have been approved to meet the liberal education core and designated theme requirements.

Students who were enrolled in a degree program before 1994 at the University of Minnesota, Twin Cities and have been following the general education requirements designated as areas A-D, have the option of completing their COAFES degrees using those requirements. For a summary of the requirements and a complete list of courses to fulfill them, students should consult with their adviser or the COAFES Student Services Office.

All other transfer students will be held to the current liberal education requirements. The number of credits required for graduation is dictated by the liberal education program a student follows. Students in the environmental science major must complete the current liberal education requirements.

Program Requirements—Students are responsible for the program requirements that are in effect for their major the semester they enter the college. COAFES Student Services Office provides students with a current program sheet or Academic Progress Audit System (APAS) Report at orientation/registration.

Students can choose to move to newer program requirements as the program changes in subsequent years or semesters, but students must assume the new requirements in total. To move to a newer program, students file a *Change of Major* form, available in the COAFES Student Services Office. Upon processing the form, the Student Services Office provides students with an updated APAS report or program sheet. The student and his or her adviser should follow those requirements for graduation. The final degree clearance is processed using the student's declared major.

Students who request a leave of absence, or who are not enrolled for more than two consecutive semesters but are without a leave of absence, should consult the Policies section of this catalog.

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 to the agricultural and food business management major, students must meet the following 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 or ApEc 1251
 - 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, 231 Classroom Office Building, or from the COAFES Student Services Office, 120 Biosystems and Agricultural Engineering.

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, area of emphasis courses, and technical 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 (3 cr)
 Rhet 1223—Oral Presentations in Professional Settings (3 cr)
 Rhet 3257—Scientific and Technical Presentations (3 cr)
 Math 1142—Short Calculus (3 cr)
 or Math 1271—Calculus I (4 cr)

Note: Students contemplating graduate work are encouraged to take both Math 1271 (4 cr) and Math 1272 (4 cr).

Complete at least 8 credits of physical and biological sciences from courses listed below. The courses taken should be selected to provide the science background for the agricultural science courses listed below.

Biol 1009—General Biology (4 cr)
 Biol 2012—General Zoology (4 cr)
 Biol 2022—General Botany (3 cr)
 Chem 1011—General Principles of Chemistry (4 cr)
 Chem 1021—Chemical Principles I (4 cr)
 Chem 1022—Chemical Principles II (4 cr)

Professional Requirements

Applied Economics

Core courses and electives required of all majors:

ApEc 1001—Orientation (1 cr)
 ApEc 1101—Principles of Microeconomics (3 cr)
 ApEc 1102—Principles of Macroeconomics (3 cr)
 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)
 6-8 credits from Applied Economics in an area of emphasis. An internship (ApEc 4096) or special project is encouraged.*

Carlson School of Management

Core courses and electives required of all majors:

Acct 2050—Introduction to Financial Reporting (4 cr)
 Acct 3001—Introduction to Management Accounting (2 cr)
 Mgmt 3001—Fundamentals of Management (2 cr)
 Mktg 3001—Principles of Marketing (2 cr)
 OMS 1550—Business Statistics: Data Sources, Presentation, and Analysis (4 cr)
 6-8 credits from the Carlson School of Management in an area of emphasis.*

**Note:* Electives in applied economics and from the Carlson School of Management are to be used to meet requirements in one of the following areas of emphasis.

Areas of Emphasis

12 credits in one of the following areas of emphasis:

Business Management

Acct 3201—Intermediate Management Accounting (2 cr)
 ApEc 3401—Markets, Marketing and Prices (2 cr)
 ApEc 3451—Food and Agricultural Sales (3 cr)
 ApEc 3921—Agricultural Law (3 cr)
 ApEc 4096—Professional Experience Program: Internship (1-3 cr)
 ApEc 5811—Cooperative Organizations (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 (4 cr)
 HRIR 3041—Individual in the Organization (2 cr)
 Mgmt 4002—Managerial Psychology (4 cr)
 Mgmt 4008—Entrepreneurial Management (4 cr)
 OMS 3056—Production and Inventory Management (4 cr)

Marketing and Sales Management

ApEc 3401—Markets, Marketing and Prices (2 cr)
 ApEc 3411—Grain Marketing Economics (3 cr)
 ApEc 3421—Livestock and Meat Marketing Economics (2 cr)
 ApEc 3451—Food and Agricultural Sales (3 cr)
 ApEc 3921—Agricultural Law (3 cr)
 ApEc 4096—Professional Experience Program: Internship (1-3 cr)
 ApEc 4481—Futures and Options Markets (3 cr)
 ApEc 5401—Price Analysis, Futures and Options Markets (3 cr)
 ApEc 5751—Agricultural Trade and Trade Policy: Issues and Analysis (3 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 4060—Marketing and Distribution Channels (4 cr)
 Mktg 4070—International Marketing (4 cr)
 Mktg 4080—Marketing Strategy (4 cr)

Financial Management

Acct 3201—Intermediate Management Accounting (4 cr)
 Acct 5160—Financial Statement Analysis (4 cr)
 ApEc 3921—Agricultural Law (3 cr)
 ApEc 4096—Professional Experience Program: Internship (1-3 cr)
 ApEc 4481—Futures and Options Markets (3 cr)
 ApEc 5811—Cooperative Organizations (3 cr)
 BLaw 3058—The Law of Contracts and Agency (4 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 4322—Security Analysis (4 cr)
 Fina 4541—Futures, Options, and Derivatives (4 cr)
 Fina 4641—International Finance and Risk Management (4 cr)
 Econ 4432—International Finance (3 cr)
 Ins 5100—Corporate Risk Management (2 cr)

Food Processing, Wholesaling, and Retailing

ApEc 3401—Markets, Marketing and Prices (2 cr)
 ApEc 3451—Food and Agricultural Sales (3 cr)
 ApEc 4096—Professional Experience Program: Internship (1-3 cr)
 ApEc 4451—Food Marketing Economics (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)
 Mktg 3010—Marketing Research (4 cr)
 Mktg 4030—Selling and Sales Management (4 cr)
 Mktg 4050—Integrated Marketing Communications (4 cr)
 Mktg 4080—Marketing Strategy (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.

Technical Emphasis

An additional 9 credits are required in an area of technical emphasis. At least one course must be 3xxx or 5xxx. Courses in agricultural education, fisheries and wildlife, landscape architecture, rhetoric, or physical and biological sciences may not be used to meet the requirement. In agricultural engineering, only AgET 3025 and AgET 5410 may be used.

In the past 10 years, approximately 40 varieties of barley, oat, wheat, soybean, wild rice, alfalfa, and bluegrass have been developed and made available to growers of Minnesota.

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 CEHD and the College of Agricultural, Food, and Environmental Sciences. Students may choose one of three specialization areas: agricultural science and technology education; agricultural leadership, training, and development; or natural and managed environmental education.

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. In addition, graduates of this specialization also are qualified for a broad array of agriculturally related positions in sales, management, finance, and production aspects of agriculture. The specialization allows students to have an emphasis area that includes a broad agricultural science and technology background.

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 (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 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)

Chem 1011—General Principles of Chemistry (4 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 1103—Crops, Environment and Society (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)**

Agro 3003—Introduction to Integrated Weed Management (1 cr)
Ent 3001—Insects and Insect Management (1 cr)
PIPa 3001—Plant Disease Biology and Management (1 cr)

Plus 3-4 credits from the following:

Agro 1101—Biology of Plant Food Systems (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)

FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)

Plus 3 credits from the following:

Agro/AnSc 3203—Environment, Global Food Production, and Citizens (3 cr)
EEB 3001—Ecology and Society (3 cr)
ES 1011—Issues in the Environment (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)

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

Professional Education (38-38.5 cr)**Foundations (15-15.5 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 (4 cr)
 AFEE 5113—Adult Agricultural Education Program Development and Technology (3 cr)
 AFEE 5114—Agricultural Education Teaching Seminar (1 cr)

Work, Community, and Family Education (8 cr)

WCFE 5697—Teaching Internships: School and Classroom Settings (2 cr)
 WCFE 5698—Teaching Internship (6 cr)

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 124 credits, including required courses in the major. Students also must complete the University's liberal education (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 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 (8 cr)

Phil 1003—Introduction to Ethics (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)

Agro 3003—Introduction to Integrated Weed Management (1 cr)
 Ent 3001—Insects and Insect Management (1 credit)
 PIPa 3001—Plant Disease Biology and Management (1 cr)

Plus at least 6 credits from the following:

Agro 1101—Biology of Plant Food Systems (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 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.

AdEd 5102—Perspectives of Adult Learning and Development (3 cr)

HRD 5001W—Survey: Human Resource Development and Adult Education (3 cr)

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)
 PIPa 2002—Diseases of Field Crops (3 cr)
 PIPa 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)

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. They must maintain an overall GPA of 2.00 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 (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 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 (9-10 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 1103—Crops, Environment and Society (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)
 Psy 1001—Introduction to Psychology (4 cr)
 or GC 1281—General Psychology (4 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)

Environmental Science (40 cr)

Environmental (8-9 cr)

ES 1011—Issues in Environment (3 cr)
 FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)

Plus 2-3 credits from the following:

EEB 3001—Ecology and Society (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)

PIPa 3001—Plant Disease Biology and Management (1 cr)

Ent 3001—Insects and Insect Management (1 cr)

Agro 3003—Introduction to Integrated Weed Management (1 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 (38–38.5 cr)**Foundations (15–15.5 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 (4 cr)

AFEE 5113—Adult Agricultural Education Program Development and Technology (3 cr)

AFEE 5114—Agricultural Education Teaching Seminar (1 cr)

Work, Community, and Family Education (8 cr)

WCFE 5697—Teaching Internship: School and Classroom Settings (2 cr)

WCFE 5698—Teaching Internship (6 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 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.

Admission Requirements—Admission to COAFES.

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 (calculus, accounting, and statistics) and science (biology and chemistry) and (2) professional courses with three major clusters (communications, business, and agricultural sciences). Students must complete at least 13 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 1142—Short Calculus (3 cr)

or Math 1271 Calculus I (4 cr)*Plus one of the following:*

Agro 4101—Experimental Design/Plot Techniques (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 (3 cr)

or Biol 1009—General Biology (4 cr)

BioC 1012—General Principles of Biochemistry (3 cr)

Chem 1011—General Principles of Chemistry (4 cr)

Professional Requirements**Experiential**

AFEE 1002—Principles of Career Planning for Agricultural Professionals (1 cr)

xxxx 4096—Professional Experience Program (3 cr)

or AIM 4011—Student Project/Field Investigation (3 cr)

One of the following:

ApEc 3451—Food and Agricultural Sales (3 cr)
 BIE 3061—Professional Sales Management (3 cr)

Communications

Rhet 1101—Writing to Inform, Convince and Persuade (4 cr)
 Rhet 1152—Writing on Issues in Science and Technology (3 cr)
 Rhet 1223—Oral Presentations in Professional Settings (3 cr)
 Rhet 3562—Technical and Professional Writing (4 cr)
 Rhet 3257—Scientific and Technical Presentations (3 cr)

Plus one of the following:

Rhet 3266—Group Process, Team Building, and Leadership (3 cr)
 Rhet 5258—Information Gathering Techniques in Scientific and Technical Communications (3 cr)

Business

ApEc 1101—Principles of Microeconomics (3 cr)
 ApEc 1102—Principles of Macroeconomics (3 cr)
 ApEc 3001—Applied Microeconomics: Consumers and Markets (4 cr)
 ApEc 3002—Applied Microeconomics: Managerial Economics (3 cr)
 ApEc 3402—Markets, Marketing and Prices (2 cr)

One of the following:

ApEc 3411—Grain Marketing Economics (2 cr)
 ApEc 3421—Livestock and Meat Marketing Economics (2 cr)
 ApEc 3821—Retail Center Management (3 cr)
 ApEc 4451—Food Marketing Economics (3 cr)
 Plus one of the following: ApEc 4501, ApEc 5481, Jour 3201, Rhet 4165, Spch 3441

Agriculture

AgET 3213—Engineering Principles and Applications (3 cr)
 or FScN 1102—Food: Safety, Risks, and Technology (3 cr)
 Agro 1103—Crops, Environment, and Society (4 cr)
 or Hort 1101—Plant Propagation (4 cr)
 AnSc 1011—Domestic Animals and Society (3 cr)
 Soil 2125—Basic Soil Science (4 cr)
 or FScN 1112—Principles of Nutrition (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*

Agro 3003—Introduction to Integrated Weed Management (1 cr)
 Agro 3005—Applied Crop Physiology and Development (2 cr)
 Biol 3002—Plant Biology: Function (2 cr)
 PIPa 3001—Plant Disease Biology and Management (1 cr)
 Soil 3416—Plant Nutrients in the Environment (3 cr)
 Plus at least 4 credits from the following: Agro 2103, Agro 3203, Agro 4305, Agro 4401, Agro 4505, Agro 4603, Agro 4605, Ent 4005, PIPa 2002, Soil 3221, Soil 3612, Soil 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

Biol 3002—Plant Biology: Function (2 cr)
 Hort 1012—Woody Landscape Plants (3 cr)
 or Hort 1011—Herbaceous Landscape Plants (3 cr)
 Hort 3005—Environmental Effects on Horticultural Crops (2 cr)

Plus at least 7 credits from the following:

Hort 4061, Hort 3002, Hort 4021, Hort 4041, Hort 4051, Hort 4071, Hort 4072, Hort 4401, Hort 5023, Hort 5031, Hort 5071, Hort 5183, PIPa 2001

Food Industries

ApEc 4451—Food Marketing Economics (3 cr)
 FScN 1021—Introductory Microbiology (4 cr)
 FScN 3102—Introduction to Food Science (3 cr)

Plus at least 3 credits from the following:

FScN 1511—Food Animal Products for Consumers (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 according to student's interests, in consultation with an adviser and with approval of the AIM major committee.

Electives

Final Project

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

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—Plant and Crop Science (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)
 Soil 2125—Basic Soil Science (4 cr)
 VPB 3103—General Microbiology (4 cr)

Choose at least 11 credits from the following (courses from this list cannot be applied to an area of emphasis):

AnSc 1011 (3 cr), ApEc 1251 (3 cr), Ent 3001 (1 cr), AnSc 3203 (3 cr), AgEt 3213 (3 cr), AnSc 3305 (4 cr), ApEc 3421 (2 cr), ApEc 3451 (3 cr), AnSc 3511 (3 cr), ApEc 3811 (3 cr), Ent 4281 (2 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)

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

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) (2 cr)
AnSc 3102—Equine Management (ITV from Crookston) (2 cr)
Students must complete at least 2 credits of selected equine lab courses offered during summer sessions at Crookston.

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 students' 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.

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.

Admission Requirements—Admission to COAFES.

Degree Requirements

Students must complete at least 120 credits to graduate, including 52 credits in the major. Besides completing the liberal education requirements of the University, 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. According to their interests, students select the remainder of their courses from the categories of professional application (specialization), technical emphasis, and electives. All required courses must be taken A-F, and a grade of at least C- is required in all professional courses, area of emphasis courses, and technical emphasis courses.

Required Courses

Foundation Requirements

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 6 credits in social sciences beyond the 6 credits required for liberal education.

Math 1142—Short Calculus

or Math 1271—Calculus (4 cr)

Note: Students contemplating graduate study are encouraged to take Math 1271—Calculus I (4 cr) and Math 1272—Calculus II (4 cr).

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)
OMS 1550—Business Statistics (4 cr)

A. Professional Application Cluster (12 cr min)

At least two ApEc courses plus one or two more courses from ApEc, Econ, or Carlson School of Mgmt. Students are encouraged to take 9 or more of these 12 credits in one of the following areas:

- Management and Finance: ApEc 4401, ApEc 4821, ApEc 3501, ApEc 5031, ApEc 5811
- Marketing: ApEc 3451, ApEc 3411, ApEc 3421, ApEc 4481, ApEc 4451, ApEc 5401, ApEc 5811
- Food Retailing: ApEc 4821, ApEc 4451, DHA 4241, Mktg 3001, HRIR 3041
- Trade and Development: ApEc 3041, ApEc 3071, ApEc 5711, ApEc 5721, ApEc 5751, ApEc 4791
- Resources and Environment: ApEc 4611, ApEc 5611, ApEc 5341, ApEc 5651, Econ 4619, Econ 4831
- Regional and Public Economics: ApEc 5321, ApEc 5341, ApEc 56xx, Econ 3801, Econ 4629, Econ 4623
- Individualized Professional Cluster: To develop such a program, consult with adviser.

Technical Emphases (12 cr min)

With the help of an adviser, students select at least three courses from at least two departments. At least one course should be 3xxx or above.

Electives—Several courses in the Carlson School and in the Economics Department are optional in meeting the professional requirement and the professional application cluster chosen.

Internships

Internships are recommended for all students in the major.

Minor Requirements

For students who want to include a basic core of 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)

Electives (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—Biometeorology (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 340—Geography of Environmental Systems (3 cr)

Geog 5423—Climate Models and Modeling (3 cr)

Geog 5426—Climatic Variations (3 cr)

Soil 5401—Introduction to Atmospheric Science (3 cr)

Soil 5402—The Atmospheric Boundary Layer (3 cr)

Crops and Soils Resources Management

B.S.

The crops and soils resources management major is for students who are interested in becoming proficient in those 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 production as a part of managed ecosystems with local and global connections.

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 support staff. Quality performance in the major prepares students to pursue crops and environmental science related graduate degrees.

Admission Requirements—Admission to COAFES.

Degree Requirements

Students must complete at least 120 credits to graduate, including 66 credits in the major. 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.

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

BioC 1012—General Principles of Biochemistry (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

AFEE 1002—Principles of Career Planning for Agricultural Professions (1 cr)

AgET 3213—Engineering Principles and Applications (3 cr)

Agro 1103—Crops, Environment, and Society (4 cr)

Agro 2501—Weed Biology, Ecology, and Systematics (2 cr)

Agro 3005—Applied Crop Physiology and Development (2 cr)

and Bio 3002—Plant Biology: Function (2 cr)

or Hort 3005—Applied Crop Physiology and Development (2 cr)

and Bio 3002—Plant Biology: Function (2 cr)

Agro 4096—Professional Experience Program: Internship (3 cr)

Agro 4305—Crop Harvest, Storage, Processing, Utilization (3 cr)

or FScN 5551—Grains: Introduction to Cereal Chemistry and Technology (2 cr)

Agro 4401/Hort 4401—Plant Genetics and Breeding (4 cr)

Agro 4505—Integrated Weed Management (4 cr)

Agro 4603—Field Crop Scouting and Problem Diagnosis (2 cr)

Agro 4605—Crop Management Technologies (3 cr)

or Hort 5030—Sustainable Horticultural Food Production (4 cr)

Agro 4660—Senior Capstone (2 cr)

AnSc 1101—Introductory Animal Science (4 cr)

ApEc 1101—Principles of Microeconomics (3 cr)

ApEc 3451—Food and Agricultural Sales (3 cr)

or BIE 3061—Professional Sales Management (3 cr)

ApEc 3811—Principles of Farm Management (3 cr)

Ent 4005—Economic Entomology (3 cr)

PIPa 2002—Diseases of Field Crops (3 cr)

or PIPa 2001—Introductory Plant Pathology for Horticulturists (3 cr)

Soil 2125—Basic Soil Science (4 cr)

Soil 3221—Soil Conservation and the Land Use Management (3 cr)

or Soil 3612—Soil and Environmental Biology (3 cr)

Soil 3416—Plant Nutrients in the Environment (3 cr)

One of the following:

AgET 5203—Environmental Impacts of Food Production (3 cr)

Agro 3203—Environment, Global Food Production, and the Citizen (3 cr)

NRES 3021—Plant Resource Management and the Environment (3 cr)

Electives

Final Project

Agro 4096—Professional Experience Program.

Note: The major in Crops and Soils Resources Management 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.

Find it



Some courses for
COAFES degree
programs can be
taken during summer
or intersession.

To find them, see the
Class Schedule
or go to [http://
onestop.umn.edu/
Courses/
schedule.html](http://onestop.umn.edu/Courses/schedule.html).

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 4005—Field Crops Entomology (2 cr)

Ent 4015—Ornamental and Turf Entomology (2 cr)

Ent 4251—Forest and Shade Tree Entomology (2 cr)

Ent 4281—Livestock 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 1012—General Principles of Biochemistry (3 cr)

Biol 1009—General Biology (4 cr)

Biol 2022—General Botany (3 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)

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)

PIPa 2001—Introductory Plant Pathology for Horticulturists (3 cr)

PIPa 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 (3 cr)

Hort 5024—Landscape Development (1 cr)

At least two additional horticultural science courses (6-8 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)

Hort 5042—Nursery Operations (1 cr)

At least two additional horticultural science courses (7-8 cr)

Greenhouse Production and Retail Floriculture (18 cr min)

ApEc 3821—Retail Center Management (3 cr)

Hort 4051—Floriculture Production and Management I (4 cr)

Hort 5051—Floriculture Production and Management II (4 cr)

At least two additional horticultural science courses (7-8 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 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.

Minor Requirements

Hort 1001—Plant Propagation (4 cr)

Hort 3005—Environmental Effects on Horticultural Crops (2 cr)

At least 12 credits of horticultural science electives of which one course from a related area may be used. A maximum of 3 credits of Hort 5090—Directed Studies may be applied to the minor.

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).

Admission Requirements—Acceptance to COAFES.

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 area. 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)

ApEc 1102—Principles of Macroeconomics (3 cr)

BioC 1012—General Principles Biochemistry (3 cr)

or Chem 2301—Organic Chemistry I (3 cr)

Biol 1001—Introductory Biology I: Evolutionary and Ecological Perspectives (4 cr)

Biol 1002—Introductory Biology II: Molecular, Cellular, and Developmental Perspectives (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)

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)

Geo 1001—Introduction to Geology (4 cr)

NRES 3061—Water Quality Management (3 cr)

PIPa 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 Land-Use Management (3 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 1101—Biology of Plant Food Systems (4 cr)

Agro 1103—Crops, Environment, and Society (3 cr)

NRES 3021—Plant Resource Management and the Environment (3 cr)

Areas of Emphasis (15 cr)

Land and Water Resources

Land Use Management Required Courses

FR 3601—Elements of Surveying (1 cr)

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 6 credits 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 3355—Environmental Quality (3 cr)

Geog 3361—Land Use, Landscapes and the Law (3 cr)

Geog 3401—Geography of Environmental Systems (3 cr)

Hort 5071—Landscape and Reclamation Ecology (3 cr)

NRES 3575—Wetlands Conservation (3 cr)

PA 5013—Law and Urban Land Use (3 cr)

Soil Science Required Courses

(for soil science license, students must complete required courses)

Soil 4511—Field Study of Soils (2 cr)

Soil 5232—Soil Physics (3 cr)

Soil 5515—Soil Genesis and Landscape Relations (3 cr)



Select 7 credits from the following:

- Geo 4701—Geomorphology (3 cr)
- Geo 4703—Glacial Geology (4 cr)
- Soil 3521—Soil Judging (1 cr)
- Soil 4121—Microbial Ecology and Applied Microbiology (3 cr)
- Soil 4216—Contaminant Hydrology (2 cr)
- Soil 5211—Biometeorology (3 cr)
- Soil 5555—Wetland Soils (3 cr)
- Soil 5611—Soil Biology and Fertility (3 cr)
- Soil 5711—Forest Soils (2 cr)

Sustainable Agriculture Required Courses

- Agro 1103—Crops, Environment, and Society (4 cr)
- Agro 3003—Introduction to Integrated Weed Management (1 cr)
- Agro 3203—Environment, Global Food Production and the Citizen (3 cr)
- Agro 4888—Issues in Sustainable Agriculture (2 cr)
- Ent 3001—Insects and Insect Management (1 cr)
- PIPa 3001—Plant Disease Biology and Management (1 cr)

Select 6 credits from the following:

- Agro 4103—World Food Problems (3 cr)
- Agro 4201—Agro-Ecosystems and Crop Production (3 cr)
- Agro 4505—Integrated Weed Management (4 cr)
- Ent 5321—Ecology of Agriculture (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 4101—Conservation of Biodiversity (3 cr)

Soil 5611—Soil Biology and Fertility (3 cr)

Water Resources

Hydrology Required Courses

Students completing the hydrology emphasis are eligible for state and federal certification as hydrologists.

- AgET 4223—Hydrology and Water Quality (3 cr)
- or 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)
- FR 5153—Forest and Wetland Hydrology (3 cr)
- or Soil 5555—Wetland Soils (3 cr)
- Geo 5701—General Hydrogeology (3 cr)
- Math—1271/1272 Calculus I and 11 (4/4 cr)
- Math 2243—Linear Algebra and Differential Equations (3 cr)
- WRS 5001—Field Methods in Water Resources (3 cr)

Resource Management Required Courses

- CE 4541—Environmental Water Chemistry (4 cr)
- Soil 5555—Wetland Soils (3 cr)

Select 8 credits from the following:

- EEB 4601—Limnology (3 cr)
- Ent 5361—Aquatic Insects (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)
- NRES 3575—Wetlands Conservation (3 cr)
- WRS 5001—Field Methods in Water Resources (3 cr)
- WRS 5101—Water Resources: Individuals and Institutions (3 cr)

Environmental Management

Bioremediation Required Courses

- Chem 2301—Organic Chemistry I (3 cr)
- Chem 2302—Organic Chemistry II (3 cr)
- Soil 5601—Principles of Waste Management (3 cr)
- Soil 5611—Soil Biology and Fertility (3 cr)
- or Soil 4121—Microbial Ecology and Applied Microbiology (3 cr)

Select 6 credits from the following:

- CE 4551—Environmental Microbiology/Lab (4 cr)
- CE 4562—Remediation Technology (3 cr)
- PubH 5111—Preventing Pollution (3 cr)
- PubH 5180—Environmental Microbiology (4 cr)

Environmental Measurement Required Courses

- PIPa 3002—Air Pollution, People and Plants (3 cr)
- PubH 5190—Environmental Chemistry (3 cr)
- Soil 5211—Biometeorology (3 cr)

Select 6 credits from the following:

- CE 4541—Environmental Water Chemistry (4 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 5200—Environmental Health (2 cr)

Waste Management Required Courses

- PubH 5111—Preventing Pollution (3 cr)
- Soil 5601—Principles of Waste Management (3 cr)

Select 9 credits from the following:

- CE 4561—Solid and Hazardous Wastes (3 cr)
- CE 4562—Remediation Technology (3 cr)
- PubH 5103—Exposure to Environmental Hazards (2 cr)
- PubH 5112—Risk Analysis: Application to Risk-Based Decision Making (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 5611—Soil Biology and Fertility (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 Department. Program requirements are detailed on page 49.

General Environmental Education Required Courses

- FR 5403—Fundamentals of Natural Resource Education (3 cr)
- NRES 3202—Leadership, Planning, and Conflict Management in Natural Resources (3 cr)
- or NRES 3011—Ethics and Leadership in Natural Resource Management (3 cr)
- NRES 4811—Natural Resources Interpretation (3 cr)

Select 6 credits from the following:

- Agro 4103—World Food Problems (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 5537—Special Topics: 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 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
- Hort 5071—Restoration and Reclamation Ecology (3 cr)
- NRES 1041—Natural Resources as Raw Materials (3 cr)
- NRES 3205—Field Ecology in NRES (4 cr)
- NRES 3575—Wetlands Conservation (3 cr)
- NRES 4101—Conservation of Biodiversity (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)

Final Project

Internship requirement—students must complete ES 4096.

Student teams in nutrition and food science have won three consecutive national championships in product development competitions.

Food Science

B.S.

Food scientists apply principles of chemistry, physics, and microbiology to food processing, preservation, and product development. The food science program provides students with a foundation in calculus, chemistry, physics, communications, statistics, and biology. Professional courses center around food engineering/processing, food chemistry, food microbiology, and food quality.

Degree Requirements

Students must complete at least 120 credits to graduate, including 92 credits in the major. Students must also complete 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 a grade of at least C- is required in all professional courses.

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)
 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)
 Stat 3011—Introduction to Statistical Analysis (4 cr)
 Choose one of the following lab courses: BioC 4025, Chem 2111, Chem 2311, FScN 4613
 Choose one of the following microbiology courses: MicB 2032, MicB 3301, VPB 2032
 Choose one of the following physics series: Phys 1101/1102, Phys 1201/1202, Phys 1301/1302
Note: Phys 1301 and 1302 are recommended.

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—Lab 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 courses with a Capstone component: FScN 4341, FScN 4342, FScN 4343, FScN 4344, FScN 4345, FScN 4346

Minor Requirements

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

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—Weed Biology Systematics (2 cr)
 Agro 4505—Integrated Weed Management (4 cr)
 Ent 5211—Insect Pest Management (3 cr)
 PIPa 5204—Epidemiology and Plant Disease Resistance (4 cr)
Choose one of the following management courses:
 Agro 4605—Management Technologies 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 (2 cr)
 Agro 4888—Issues in Sustainable Agriculture (2 cr)
 PIPa 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)

College of
 Agricultural, Food, and
 Environmental Sciences

Nutrition

B.S.

The nutrition major explores how nutrients and the foods from which they are derived aid the body in health, growth, and development. Given national and international concern for how food and nutrition affect health and disease, there are many career opportunities for registered dietitians and nutritionists. Students choose one of three options: nutrition, 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 to graduate, including required credits in the major. Students must also complete 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 a grade of at least C- is required in all professional courses.

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 3562—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, electives, 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, and demonstrated leadership skills, and who are highly recommended, may apply for a postbaccalaureate dietetic internship.

Additional Courses

FScN 3614—Nutrition Education (2 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 (2 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 (2 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 (2 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 (2 cr)
 Math 1031—College Algebra and Probability (3 cr)
 Mgmt 3001—Fundamentals of Management (2 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 (3 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 (3 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)

Minor Requirements

For those having completed Biol 1009; Chem 1021, 1022, and 2301; and BioC 3021:

FScN 1112—Principles of Nutrition (3 cr)
 FScN 3612—Lifecycle Nutrition (3 cr)
 FScN 4612—Human Nutrition (3 cr)
 FScN 4613—Experimental Nutrition (2 cr)
 FScN 5621—Nutrition and Metabolism (4 cr)

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.

Admission Requirements—See COAFES policy.

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 liberal education diversified core and designated themes. See the University's liberal education statement on page 35 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 2022—General Microbiology (4 cr)
 or VPB 2022—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, AnSc 1403, AnSc 3203, AnSc 3305, AnSc 3327, AnSc 3511, AnSc 4011, AnSc 4401, AnSc 4403, AnSc 4405, AnSc 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, FScN 4122, FScN 4131, FScN 4312, FScN 4331, FScN 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 FScN 2103, FScN 4103, FScN 4613, FScN 5622, FScN 5623, AnSc 4401, AnSc 4403, AnSc 4405

Plant Science (26-27 cr)

Agro 1101—Biology of Plant Food Systems (3 cr)
or Hort 1001—Plant Propagation (4 cr)
 Agro 2501—Weed Biology and Systematics (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)
 PIPa 2001—Introductory Plant Pathology for Horticulturists (3 cr)
or PIPa 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, Soil 4121, Soil 5232, Soil 5515, Soil 5555, Soil 5211

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, Artificial Insemination, and Lactation (4 cr)
 AnSc 3221—Animal Breeding (4 cr)
 Plus two from AnSc 4401, AnSc 4403, AnSc 4405, AnSc 4501
 Plus one from AnSc 4601, AnSc 4603, AnSc 4604, AnSc 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.

University rhetoric students participated with nine other schools worldwide on an international team dealing with technology and community-building sponsored by Apple, Inc.

Admissions Requirements—Students who wish to major in scientific and technical communication should take the following steps.

1. Declare the major with COAFES.
2. Make an appointment with the scientific and technical communication assistant major coordinator. Students should bring samples of writing, computer work, graphics, Web pages, or any other form of communication they created. If a student doesn't have samples, he or she should bring a short essay (2-3 pages) that describes their interest in scientific and technical communication. These materials are a way for advisers to get to know more about the student's interests and are not part of any formal admissions procedure. The student should also bring a recent copy of their APAS report.

At the first meeting, the assistant major coordinator discusses the student's interest in the major, reviews the requirements for completing the major, and has the student complete the *Major Program Form*. The form provides official notice that the student is a scientific and technical communication major.

The assistant major coordinator serves as the student's academic adviser during the first stages of the program. The student is assigned a faculty adviser after completing the following requirements:

- At least 30 credit hours (including accepted transfer credits)
- At least the following three courses taken in the Department of Rhetoric or as accepted transfer credits:
 - Rhet 1223—Oral Presentations in Professional Settings (3 cr)
 - Rhet 3221—Theories of Human Communication (4 cr)
 - Rhet 3562—Technical and Professional Writing (4 cr)

Degree Requirements

Students must complete at least 120 credits to graduate, including 85 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). However, at least 30 credits in areas A, B, C, D, and E must be completed in the Department of Rhetoric, as follows.

Area A. Communication Design (30 cr)

A-1. Written Communication (15 cr)

- Rhet 1152—Writing on Issues of Science and Technology (4 cr)
- Rhet 3562—Technical and Professional Writing (4 cr)
- Rhet 4561—Editing and Style for Technical Communicators (3 cr)
- Rhet 5662—Advanced Technical Communication (4 cr)

A-2. Oral Communication (9 cr)

- 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)

A-3. Visual Communication (6 cr)

- Rhet 4671—Principles and Application of Project Management and Design I (3 cr)
- Rhet 4672—Principles and Application of Project Management and Design II (3 cr)

Area B. Communication Expertise (9 cr)

Students work with their adviser to select courses in one area of communication in which they would like to develop expertise. Possible areas include written communication, multimedia, training and development, public relations and management, information management systems, sales and marketing, oral communication, visual communication, business communication, and international communication.

Area C. Information Management and Theory (23 cr)

C-1 Information Management (9 cr)

Rhet 4501—Usability and Human Factors in Technical Communication (3 cr)

Plus at least 6 credits from Rhet 3401, Rhet 4165, Rhet 4573, Rhet 5111/5112, Rhet 5258, Rhet 5562

C-2 Theory (11 cr)

Rhet 3221—Theories of Human Communication (4 cr)

Rhet 3701—Rhetorical Theory and Scientific and Technical Communication (4 cr)

Rhet 5511—Research in and Scientific and Technical Communication (3 cr)

C-3 Internship (3 cr)

Rhet 4196—Internship in Scientific and Technical Communication (3-6 cr)

Area D. Science, Technology, and Society (10 cr)

Rhet 1302—Science, Religion, and the Search for Human Nature (3 cr)

Rhet 3108—Gender and the Rhetoric of Science and Technology (4 cr)

Rhet 3371—Technology, Society, and Self (3 cr)

Area E. Scientific or Technical Competency (15 cr)

Students develop expertise in a specific scientific or technical area, in consultation with their adviser. Courses are limited to science and technology fields. The courses may be from multiple departments but cannot be taken from the Department of Rhetoric. At least two courses in the area must be upper division.

Scientific areas include, but are not limited to, agricultural science (including plant science and horticulture), animal science, astronomy, biology, chemistry, climatology, ecology, environmental science, food science/nutrition, health science, natural resources, and physics.

Engineering and technical areas include aerospace engineering, biomedicine, civil engineering, cognitive psychology (including human factors and ergonomics), computer science, electrical engineering, mathematics, and mechanical engineering.

To discuss non-rhetoric courses required as part of the major, contact the Department of Rhetoric assistant major coordinator.

Electives—The program accepts equivalent courses in all areas (except for required rhetoric courses as listed under Required Courses). Students are also expected to take courses outside of rhetoric in areas listed under Required Courses such as area B and area E.

Language Requirements

Scientific and technical communication majors are encouraged to take a foreign language. In addition, students may choose international communication as their area of emphasis under area B.

Final Project

All students must participate in an internship, under area C: Rhet 4196—Internship in Scientific and Technical Communication (3-6 cr).

Minors

The Department of Rhetoric offers three minors

- Designing with New and Emerging Technologies
- 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 612-624-4761 for more information.

Designing Documents with New and Emerging Technologies

Minor Only

The minor focuses on designing effective documents with both traditional and emerging technologies. Students learn to design oral 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. Components of designing messages include audience analysis and rigorous evaluation of document effectiveness. The minor differs from the minor in technical communication 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 21 credits to receive the minor.

Required Courses

- Rhet 3101—Functional Photography (3 cr)
 or Rhet 4105—Corporate Video for Technical Communicators (4 cr)
 Rhet 3257—Scientific and Technical Presentations (3 cr)
 Rhet 3401—Accessing Information Through Electronic Media (3 cr)
 Rhet 4501—Usability and Human Factors in Technical Communication (3 cr)
 Rhet 5111—Message Design: Theory and Practice I (3 cr)
 Rhet 5112—Message Design: Theory and Practice II (3 cr)
 Rhet 5291—Independent Study (2-3 cr)

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. (Students writing the integrative paper register for Rhet 3291. See humanities coordinator in the Department of Rhetoric for approval.)

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 21 credits to complete the minor.

Required Courses

- Rhetoric 3291—Independent Study (3 cr) (The integrative paper)
 At least four of the following:
 Rhet 1152—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 (3 cr)
 Rhet 3371—Technology, Self, and Society (3 cr)
 Rhet 3383—In Search of Nature (3 cr)

At least two courses outside of the Department of Rhetoric:

- Courses should be appropriate to the student's interests and have the approval of the Rhetoric humanities course coordinator. The following list of courses would qualify for the minor; other courses may be substituted with the approval of the Rhetoric humanities course coordinator. Please observe prerequisites carefully when selecting upper division courses.
- AFEE 4221—Rural Leadership Development (3 cr)
 Agro 3203—Environment, Global Food Production and the Citizen (3 cr)
 Agro 4103—World Food Problems (3 cr)
 AnSc 3113—Animal Welfare (4 cr)
 ApEc 3041—Economic Development of U.S. Agriculture (3 cr)
 ApEc 3921—Agricultural Law (3 cr)
 ApEc 4611—Resource Development and Environmental Economics (3 cr)
 ApEc 5651—Economics of Natural Resource Policy (4 cr)
 ApEc 5711—Agriculture: Farm, Food, and Environmental Policy (3 cr)
 ES 1011—Issues in the Environment (3 cr)
 ES 1051—Introduction to Environmental Science (3 cr)
 FScN 1102—Food: Safety, Risks, and Technology (3 cr)
 NRES 1201—Conservation of Natural Resources (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 Management (3 cr)

Technical Communication

Minor Only

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 21 credits.

Prerequisite Courses

- Rhet 1101 (or 1152), 1223, and 3562
 (do not count toward credits required for the minor)

Required Courses

- Rhet 3257—Scientific and Technical Presentations (3 cr)
 Rhet 3401—Accessing Information Through Electronic Media (3 cr)
 Rhet 4561—Editing and Style for Technical Communicators (3 cr)
 Rhet 5662—Advanced Technical Communication (4 cr)
 Three 3xxx or higher courses
 Courses should be selected in consultation with the student's academic adviser and the major coordinator of the Scientific and Technical Communication Program.

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 Land-Use Management (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)
 Soil 5711—Forest Soils (2 cr)

Sustainable Agriculture

Minor Only

The minor emphasizes a holistic perspective in understanding farming and food systems and solving problems in agriculture. The importance of yield and profitability are balanced by consideration of the environment and of the health and social well being of producers, consumers, and communities. The minor provides for flexibility and individuality through several electives. Students should develop their program in consultation with an adviser in one of the COAFES major programs. To complete the minor, students must complete at least 20 credits.

Required Courses

Agro 4888—Issues in Sustainable Agriculture (2 cr)
 AnSc 3203 or Agro 3203—Environment, Global Food Production, and the Citizen (3 cr)
 Rhet 1315—The Land in American Experience (3 cr)

Electives

Courses to fulfill the remaining credit requirements of the minor may be selected from the following list; other courses may be substituted.

AgEt 5203—Environmental Impacts of Food Production (3 cr)
 Agro 3003—Introduction to Integrated Weed Management (1 cr)
 Agro 4103 or ApEc 4103—World Food Problems (3 cr)
 ApEc 3041—Economic Development of U.S. Agriculture (3 cr)
 Ent 3001—Insects and Insect Management (1 cr)
 FScN 3615—Socio-Cultural Aspects of Food, Nutrition, and Health (3 cr)
 Hort 4072—Growing Plants Organically: What It Means to Be Green (3 cr)
 Hort 5031—Sustainable Fruit and Vegetable Production Systems (4 cr)
 Soil 3221—Soil Conservation and Land-Use Management (3 cr)
 Soil 3612—Soil and Environmental Biology (3 cr)
 PIPa 1001—Microbes, Plants, and People: The Social and Economic Impact of Plant Disease (3 cr)
 PIPa 3001—Plant Disease Biology and Management (1 cr)

Internship Opportunities

Students are encouraged to gain knowledge and practical experience in sustainable agriculture through enrollment in a professional experience course or, less formally, through an internship with a sustainable agriculture producer or organization.

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

CE 4541—Environmental Water Chemistry (4 cr)
 EEB 4601—Limnology (3 cr)
or Geo 5701—General Hydrogeology (4 cr)
 FR 4114—Forest Hydrology and Watershed Management (3 cr)
 Soil 5232—Soil Physics (3 cr)
or Soil 5555—Wetland Soils (3 cr)

Electives

EEB 4605—Limnology Lab (1 cr)
 NRES 3061—Water Quality: Management of a Natural Resource (3 cr)
 FR 5153—Forest and Wetland Hydrology (3 cr)
 EEB 4601—Limnology (3 cr)
or Geo 5701—General Hydrogeology (4 cr)
 Soil 4216—Contaminant Hydrology (2 cr)
 Soil 5555—Wetland Soils (3 cr)
or Soil 5232—Soil Physics (3 cr)
 Soil 5211—Biometeorology (3 cr)
 GeoE 4351—Ground Water Mechanics (3 cr)
 WRS 5001—Field Methods in Water Resources (3 cr)

College of
 Agricultural, Food, and
 Environmental Sciences

College of Architecture and Landscape Architecture

This is the College of Architecture and Landscape
Architecture section of the 2000-2002 University
of Minnesota Undergraduate Catalog.

CALA

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College of Architecture and Landscape Architecture

General Information

The College of Architecture and Landscape Architecture (CALA) is dedicated to advancing the quality and value of the designed environment. This pursuit addresses fundamental questions about the meaning and experience of people's physical settings. Landscapes, cities, and buildings are the focus of study.

Central to CALA's mission is design education. Design is taught as the fundamental means by which architects, landscape architects, and urban designers give shape to and explore their ideas. An effective design education develops creative powers of generalization and abstraction through analysis and synthesis; a broad understanding of the arts, humanities, and sciences; a knowledge of the principles of the discipline's appropriate technology, history, theory, and professional practice; the skills necessary for describing, exploring, evaluating, and developing design ideas; and the conviction that appropriate aesthetic and ethical values are a professional responsibility.

CALA's mission is pursued 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—In addition to 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. The CALA imaging lab provides 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.

Addition and Renovation—CALA has begun a project to renovate and add to its existing building. When finished the project will provide the space necessary to unite all the activities of the college. The renovation component will provide improved design studios, additional class/jury rooms, research facilities, faculty and administrative offices, and student facilities.

The addition calls for a new library, lecture space, and additional studio area. It will function as a living laboratory of architecture and landscape architecture, showcasing and monitoring the diverse and extensive building products industry of the state. Anticipated date for completion is fall 2001.

The Design Center for American Urban Landscape (DC/AUL)—DC/AUL is a research unit within CALA. DC/AUL develops interactive educational projects in neighborhoods and communities, projects that address

national urban design and planning issues. Students, professionals, and community leaders collaborate and learn about making urban landscapes through working together on these projects. 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.

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 the College of Human Ecology section of this catalog.

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 through the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455.

Admission to the Major—For the B.S. Arch. program, students enrolled at the University may transfer to CALA for the fall semester of their sophomore year at the earliest, by filing an Application for Change of College or Status and declaring a pre-architecture major. Students transferring into the University with 30 semester credits may declare a pre-architecture major immediately upon admission.

B.A. students are admitted to the major in architecture after completing required pre-architecture courses and 55-60 credits, including current enrollment. Students transferring from other institutions must be admitted to the University before being admitted to the upper division major.

Students enrolled at the University may declare an environmental design major at any point by filing an Application for Change of College or Status. Students transferring into the University may declare an environmental design major immediately upon admission.

High School Preparation Requirements—If students have not satisfied high school preparation requirements, they will *not* be admitted to the architecture major or B.E.D. in landscape architecture program 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 in architecture (B.S.Arch.) 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.Arch. program includes an accelerated status option to allow qualified undergraduates to complete the undergraduate and M.Arch. degrees in six years rather than seven. Qualified undergraduates may also complete the nonprofessional B.E.D. and the fully accredited 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

The B.S.Arch. and B.E.D. programs incorporate a minor or elective concentration (a minimum of 15-21 approved 3xxx-5xxx credits), allowing the student to develop a theme of study and broaden the social, cultural, and international aspects of design. Courses for a minor are taken from a single department; courses for an elective concentration can be taken from a number of different departments. Students may declare a minor in any University department or program offering such an option. At graduation the minor is listed on students' transcripts with their degree and major (an elective concentration is not listed). CALA offers minors in architecture and environmental design in landscape architecture.

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.).

As of 1990, all candidates for professional registration must graduate from a nationally accredited professional degree program (or its foreign equivalent) and complete three years of professional work experience to be eligible to take the state registration examination. Registration as an architect or landscape architect is a legal requirement to practice in Minnesota and most

states in the country. Further, a professional license is required before an individual may use the designation of architect or landscape architect in any capacity.

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—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.

Department Advisers—Departments use a combination of faculty and staff advisers. Typically undergraduate majors are advised by the department's director of undergraduate studies, but may be advised by a CALA Student Services adviser.

Policies

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.

College of
Architecture and
Landscape Architecture



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 offices. Petitions are submitted to the department adviser and then forwarded 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 grades of A, B, C, or S in most courses and completing courses undertaken. For students with concerns about their academic progress, early consultation with instructors or an adviser 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.

If a student's infraction involves both CALA judicial proceedings and court proceedings and if a CALA decision might prejudice the court case, CALA will hold its decision in abeyance until the court proceedings have been concluded.

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.

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 professionals through continuing professional studies in collaboration with the American Institute of Architecture–Minnesota and Minnesota Chapter of the American Society of Landscape

Architects. Coursework includes reviews for the architectural registration examination. For more information, consult CALA's continuing professional studies brochure. CALA also offers selected preprofessional and professional courses through the College of Continuing Education. For more information, consult the *College of Continuing Education Catalog*.

CALA's mentor program matches students with professionals in their field of study.



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 professional degree students to a variety of locations. In recent years these have included Europe, China, Meso-America, the Middle East, and the American Southwest. Additionally, the college has offered an undergraduate study abroad program in Mexico. An exhibition of student work from the study abroad program is held at the beginning of fall semester.

For more information, contact the International Study 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.

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. AIAS students operate a cooperative that sells art and design supplies to students at a significant discount.

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

149 Nicholson Hall, Minneapolis (academic year 2000-01)

West wing of CALA addition, Minneapolis (after fall 2001)
626-9068

Student Services

250/251 Nicholson Hall, Minneapolis (academic year 2000-01)

West wing of Architecture Building, Minneapolis (after fall 2001)
626-1000

Departments and Programs

Department of Architecture

254 Nicholson Hall, Minneapolis (academic year 2000-01)

West wing of Architecture Building, Minneapolis (after fall 2001)
624-7866

Department of Landscape Architecture

1425 University Avenue S.E., Minneapolis (academic year 2000-01)

West wing of Architecture Building, Minneapolis (after fall 2001)
625-6860

Design Center for American Urban Landscape

Suite 222, 1313 Fifth Street S.E., Minneapolis (academic year 2000-01)

Lower level of CALA addition, Minneapolis (after fall 2001)
627-1850

Design Institute

100 Nicholson Hall, Minneapolis (academic year 2000-01)

East wing of CALA addition (after fall 2001)

625-3373

Landscape Studies Center

1425 University Avenue S.E., Minneapolis

625-6860

CALA Web Site

<www.cala.umn.edu/>

College of
Architecture and
Landscape Architecture

Find it



Find more

information about

CALA on the Web at

<www.cala.umn.edu/>

College of Architecture and Landscape Architecture

Degree Programs

Architecture

Department of Architecture

B.S.Arch.

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 in architecture (B.S.Arch.) degree 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.Arch. 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 architecture, including required courses in representation, history, theory, and design processes and an individualized elective concentration or minor planned by the student with the assistance of an adviser.

The B.S.Arch. degree program deepens the study of architecture in the context of a liberal arts education, compared to the B.A. degree with a major in architecture program, which has a broader liberal arts base (see the College of Liberal Arts section of this catalog for more information on the B.A. degree). The B.S.Arch. program 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 strong design foundation that serves a variety of careers and provides flexibility as individual opportunities change. A master's degree in architecture is required to qualify for licensure.

Admission Requirements—Students enrolled at the University may transfer to CALA in the fall semester of their sophomore year at the earliest. As pre-architecture majors pursuing the B.S.Arch., students file an *Application for Change of College or Status* and designate CALA as the college to which transfer is requested. Students transferring into the University with at least 30 semester credits may enter CALA as pre-architecture majors immediately upon admission. Students are admitted to the major based on space availability and academic record.

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 55-60 credits (may include current enrollment).

2. Meet with the Department of Architecture undergraduate adviser in the 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 elective concentration or minor.

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 50 credits must be in the major.

During their B.S.Arch. 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)

Architecture Courses (18 cr)

Representation

Arch 1301—Introduction to Drawing in Architecture and Landscape Architecture (3 cr)

History and Theory (15 cr)

Arch 1401—The Designed Environment (3 cr)

Arch 3401—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)

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 Major Requirements (34 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)

Additional upper division architecture courses (5xxx)

This core requirement is being developed by faculty. See a Department of Architecture adviser for current information. (19–20 cr)

Elective Concentration or Minor (15-cr minimum)

B.S.Arch. candidates develop an elective concentration or minor of 3xxx-5xxx courses outside the major as a means to broaden the social, cultural, and international aspects of their interest area. Courses in the minor are generally selected from one department (e.g., anthropology, art history, geography, political science). Courses for an elective concentration are chosen from various disciplines that impact design decisions (e.g., economics, geography,

housing, natural resources, urban studies). Developing and selecting courses for the minor or elective concentration is the responsibility of the individual student but may be done in consultation with an architecture adviser. The student must clearly 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 department and amending the *Major Program Form*.

Minor Requirements

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. Nine of the 18 credits are in three required courses.

Arch 1401—The Designed Environment (3 cr)

Arch 3401—Environmental Design and the Sociocultural Context (citizenship and public ethics theme and writing intensive) (3 cr)

LA 3501—Environmental Design and Its Biological and Physical Context (environment theme) (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.

Accelerated Status in Architecture

This status is a competitive opportunity for qualified undergraduates to complete the B.S.Arch. and M.Arch. 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.Arch. 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.

To be considered for accelerated status, students must be enrolled at the University as a B.S.Arch. major, have completed one year of architecture design studio (Arch 5281, Arch 5282), and have completed 90 credits. See a Department of Architecture adviser for additional criteria.

Nonmajors, students in the B.A. degree with a major in architecture program, students with B.A. or B.S. degrees in disciplines other than architecture preparing for admission to the graduate professional degree program, and first-semester transfer students are not eligible for accelerated status.

Qualified students must submit the following materials and complete an interview with the Department of Architecture director of undergraduate studies by May 1:

1. an official transcript from each institution attended by the applicant;
2. a portfolio (maximum 9 x 11-inch) containing representative works—a range of exercises from architecture drawing courses, several architecture design projects from each studio completed, and their best work from any studio arts courses;
3. two letters/evaluations of the applicant's work from instructors in architecture design studio courses;

4. a copy of the student's most current senior balance sheet from their college adviser.

Accepted candidates are notified by June 1. Written acceptance must be returned to the department within 14 days after notification or the status is reassigned to another qualified candidate. If accepted to the accelerated status, students must begin the first year of the professional curriculum the following fall semester (no deferral).

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.

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 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.

Admission Requirements—Students enrolled at the University may declare an environmental design major at any point in their academic career. Students declare an environmental design major by filing an *Application for Change of College or Status*; 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.

Degree Requirements

Students must complete at least 120 credits, including at least 55 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. 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.

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 the Graduate Record Examination (GRE) 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)
- Rhet 1223—Oral Presentations in Professional Settings (3 cr)

The following courses are recommended (not required) to fulfill CLA's liberal education requirement 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 CLA's liberal education requirement 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)
- Phil 3502—Introduction to Aesthetics (4 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 4131—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 5204—Landscape Ecology (3 cr)
- LA 5413—Introduction to Landscape Architectural History (3 cr)
- LA 5571—Landscape Construction: Landform Systems and Spatial Performance (4 cr)

The following courses are recommended (not required) to fulfill the two-course (6-8 cr) electives 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 3361—Land Use, Landscapes, and the Law (3 cr)
- Geog 5605—Geographical Perspectives on Planning (4 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 4395—Natural Resource Planning (3 cr)
- PA 4200—Introduction to Urban and Regional Planning (3 cr)
- PA 5001—Intellectual Foundations of Public Action (3 cr)

General Education

- Rhet 3562—Technical and Professional Writing (3 cr)

The following courses are recommended (not required) to fulfill the two-course requirement at the 4xxx-5xxx level (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)
- Geog 5441—Quaternary Landscape Evolution (3 cr)

The architecture and landscape architecture career paths give students the opportunity to meet practicing professionals and discuss career tracks.

Hort 5071—Restoration and Reclamation Ecology (3 cr)
 NRES 5061—Water Quality: Management of a Natural Resource (3 cr)
 NRES 5575—Wetlands Conservation (3 cr)
 PBio 4321—Taxonomy of Minnesota Flora (3 cr)

III. Open Electives

At least 20 credits are required in open elective courses from any program, at any level.

Minor Requirements

Students pursuing a minor must complete at least 21 credits. Two courses are required; the remainder are chosen from a list of optional courses.

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 3401—Environmental Design and the Sociocultural Context (3 cr)
 Hort 1012—Woody Landscape Plants (3 cr)
 LA 1101—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 5204—Landscape Ecology (3 cr)
 LA 5571—Landscape Construction: Landform Systems and Spatial Performance (4 cr)
 LA 5573—Landscape Technology: Introduction to Geographic Information Systems (3 cr)
 LA 8302—Professional Practice (3 cr)

Transfer Credits—A maximum of 9 transfer credits may be used for the minor.

Overlapping Credits—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.

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.
- 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 estimated potential to succeed as a practicing landscape architect
- staff 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)
 PBio 4321—Taxonomy of Minnesota Flora (3 cr)
 Elective course (3 cr)

Second Semester (14 cr)

LA 5203—Ecological Dimensions of Space Making (6 cr)
 LA 5372—Computer Methods II (1 cr)
 LA 5571—Landscape Construction: Landform Systems and Spatial Performance (4 cr)
 Elective (3 cr)

College of
 Architecture and
 Landscape Architecture

Find it



The CALA Student
 Services Office is
 located in 250/251
 Nicholson Hall
 during the 2000–
 2001 academic year.
 After fall 2001, the
 office will be
 relocated to the
 newly renovated
 Architecture
 Building.

College of Biological Sciences

This is the College of Biological Sciences
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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 86.

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.

Advanced Bioscience Computing Center (ABCC)—In 46 Gortner Laboratory of Biochemistry, the center 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. Student computers are available, as are workshops, a help line, and consulting (612-625-9284).

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 wide range of biology topics, research ethics, and teaching and learning techniques and accepts donations of recent biology publications (612-624-7752).

Biological Process Technology Institute (BPTI)—The institute, established in 1985, takes advantage of the unusual breadth of interest and expertise of faculty at the University to investigate cell population biology, membrane biology, molecular genetics, and protein

structure and function as they relate to biological process technology. The BPTI Bioprocessing Pilot Facility is a shared-use facility, a University-wide laboratory equipped with state-of-the-art equipment to facilitate research in fermentation, animal and plant cell culture technology, and large-scale separation of biological molecules. BPTI promotes collaboration between University researchers and industry, meeting increasing demands for students trained jointly in biological and engineering disciplines (612-624-6774).

Biological Sciences Greenhouse—On the St. Paul campus, the greenhouse is a teaching and research facility with standard bench space. Three landscaped rooms exhibit the flora of the tropics, subtropics, and desert (612-625-4788).

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).

Developmental Biology Center—The University has launched a major initiative in developmental biology, with researchers representing both the 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).

General Biology Program—Located in P180 Kolthoff Hall on the Minneapolis campus, this program administers beginning biology courses for most University students, serving approximately 3,500 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 <<http://genbiol.cbs.umn.edu>> for more information or call 612-625-6636.

High Field Nuclear Magnetic Resonance Facility—In the new Basic Sciences & Biomedical Engineering building, this is one of the better equipped NMR labs in North America.

Imaging Center—In 35 Snyder Hall, the center is a self-service facility open to University students, faculty, and staff and investigators outside the University in support of their teaching and research activities. The center specializes in light and electron optical methods, with expertise in immunofluorescence and confocal imaging. Training and technical help are provided to meet imaging needs (612-624-3454).

Institute of Human Genetics—The institute's major objective is to develop an interdisciplinary approach to studying and applying new developments in human genetics. It develops technologies necessary for understanding the structure, function, and expression of human chromosomes and genes for the prevention,

CBS graduates go on to careers in areas such as forensic science, pollution control, biochemistry, environmental planning, and molecular biology.

diagnosis, and therapy of inborn and acquired genetic disorders. The institute's programs include genetic services (Molecular Diagnostics Laboratory, microchemical facility, gene therapy program) and programs in molecular, behavioral, clinical, and population genetics, as well as genetic counseling.

Instructional Computing Center—Biology students have access to a well-equipped Macintosh computing facility in 406 Biological Sciences Center and a Windows facility in 170 Ecology Building. Priority in the computer center is given to undergraduates working on course-related materials. Students can use programs for word processing, graphing, drawing, or spreadsheets and access to many electronic databases and file servers around the world, as well as their own electronic mail service. The center houses specialized software, such as programs to help students prepare for the Graduate Record Examination (GRE). Hours for each computing lab are posted on the lab doors.

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.

Lake Itasca Forestry and Biological Station—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 Session Catalog. Reservations for and questions about the Itasca program should be addressed to the Director, Lake Itasca Program, University of Minnesota, 220 Biological Sciences Center, 1445 Gortner Avenue, St. Paul MN 55108 (612-625-1799).

Mass Spectrometry Center—Opened in April 1999, this facility offers a MALDI mass spectrometer and a state-of-the-art electrospray device. Both are available to all University biologists as well as outside researchers.

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 (612-625-2225).

Beginning College in Biology

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 known for many years that they want to major in biology when they get to college. They're the ones who have had a lifelong interest in some part of biology—maybe it's understanding diseases or animals in their habitats, or perhaps genetics has always fascinated them. Other students don't really become interested in biology until high school, when some "great teacher" or exciting course helps them determine that this might really be an interest. Still others really aren't sure at all. They aren't ready yet to decide on a college major, but biology seems to be a possibility. Or perhaps biology seems to be a good choice because of what they'd like to do after college—maybe medical school, or preserving our natural environment, or agricultural or food technology, medical research, or possibly biotechnology.

If you fit in any of these areas and have a strong high school background in science and math, then you should consider a major in biological sciences!

Is biology a good choice right now? Do biology careers look promising for the future?

Yes! Biology continues to play a critical role in our society and will be important in helping us address many of our most serious concerns and problems in this country. Our placement reports of recent graduates tell us that over 50 percent choose to go directly on to school for advanced degrees (both graduate and professional degree programs) and that approximately 50 percent secure full-time employment, almost all of them in jobs related to biology. Our Career Center continues to work closely with employers anxious to hire well-trained biology graduates. The future remains very promising!

The University of Minnesota is classified as a research university. What does this mean for undergraduates?

It's good news, especially for students in the sciences. Because our faculty members are so actively involved in research, students have extraordinary opportunities for personal involvement in research and exposure to the latest scientific findings.

Is involvement in research really available for all students, or is it an opportunity reserved only for honors students?

Most of our students participate in research. And they're involved all over the University—in medicine, dentistry, pharmacy, veterinary medicine, agriculture, and natural resources. Modern biology requires hands-on training in addition to classroom and laboratory instruction. Without some research experience, students find it difficult to get admitted to some of the more competitive graduate biology programs. Some employers prefer to hire only those biology graduates who have research or internship experience.

The University has a College of Biological Sciences rather than just a department. What does this mean for students?

A lot, actually. Because we're a college, we provide you with all the specialized services you'd expect from a college. The only difference is that all our specialized services relate specifically to your interests in biology.

We have an advising staff of biologists who can help you prepare for college, explore your career interests in biology, plan your program of study, and help you become involved in our programs. We also have our own honors program, internship program, and committed faculty of more than 120 (actually, there are more than 1,000 life sciences faculty on campus). We even have our own highly specialized Career Center to help you prepare for the biology career you choose.

Can I begin as a freshman in CBS at the University?

Yes! CBS admitted its first freshman class in fall 1997. We're excited to have these students now more directly involved with us, right from the beginning of their college careers. We've designed a number of new specialized programs and seminars specifically for freshmen.

What if I'm not sure about my major? I'm interested in biology, but also in French and geography. Can I end up in the "wrong" college?

No. You'll be taking the same University courses (including biology courses) no matter what college you start in. There are no disadvantages to being in College of Liberal Arts (CLA) as opposed to CBS. There is no such thing as "the wrong college." If you are really unsure of your major, you will find CLA to be a good place from which to explore all your academic interests.

What should I do to learn more about biology at the University to help me decide if CBS is the right place for me?

Attend one of our Visit Days, offered regularly throughout the academic year. A full-day Visit Day provides you with an opportunity to explore careers in the life sciences, meet CBS faculty and students, and tour research laboratories and the St. Paul campus. Each Visit Day program explores a different career in biology, such as molecular biology, genetics, ecology and the environment, and medicine/veterinary medicine. To request a CBS Visit Day brochure, call 612-624-9717.

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, transfers into CBS are welcome at any point in their 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

1. Submit a completed application by Dec. 15, the University's priority deadline, or before the freshman class fills
2. Have completed or are completing
 - a. four years of high school mathematics with one year each of algebra, geometry, and algebra II (trigonometry, precalculus, or calculus in the fourth year are strongly recommended)
 - b. three years of high school science, including one year each of biology, chemistry, and physics

- c. other high school preparation requirements (see "Freshman Admission" in the General Information section of this catalog)
3. Meet ACT or SAT aptitude rating standards set by CBS. For more information, contact the Office of Student Services (612-624-9717) or the Office of Admissions (612-625-2008).

Students with any post-high school college level work

1. Grades of at least C- in the following:
 - a. one semester or two quarters of college-level calculus
 - b. one semester or two quarters of inorganic chemistry
 - c. one semester or one quarter of biology
2. A 2.50 overall GPA (if transferring to the University and seeking direct admission to CBS)

Admitted students receive a letter of acceptance and welcome from both the Office of Admissions and CBS with information about orientation dates and registration.

Application for admission from outside the University

Students who do not meet freshman admission requirements, or who apply after CBS's freshman class has filled, may begin their program as prebiology students in CLA and then transfer to CBS as sophomores or juniors.

Students who want to transfer to CBS from within the University system must complete required coursework in chemistry (Chem 1021-1022), math (Math 1271-1272), and biology (Biol 1009 or 1101).

Transfer students may apply directly to CBS. To be admitted as a sophomore or junior, certain requirements must be completed before admission (see requirements for students with college level work completed). If these requirements have not been completed at the time of application, students should also apply to CLA as prebiology students. Acceptance into a prebiology program requires that students meet CLA admission standards (see the CLA section of this catalog). Acceptance into prebiology ensures that students will have contact with a biology adviser early in their academic career.

Note: Freshmen and transfer students who must first complete work as prebiology majors in another University college before entering CBS should apply between *October 1 and December 15* of the year before desired admission to ensure consideration before the priority deadline.

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).

Orientation

Before classes begin, freshmen and transfer students are invited to attend a New Student Program/Orientation. It acquaints students with the campus and provides information about the college and the University. Students spend part of the session with an adviser who helps them plan their biology 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 biology profession.

Undergraduate Programs

Students choose CBS because it has programs of exceptionally high quality offered by professors well-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 are assisted in exploring their career interests in biology through the Biology Colloquium, freshman seminars, a broad selection of course offerings, and special programs offered through the CBS Career Center, including an annual course, Biol 2001—Careers in Biology.

The CBS bachelor of science degree program comprises 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 frees individuals from the limitations of their powers of judgment and choice that result from ignorance. It provides students with the skills to seek:

- control over the general intellectual instruments for acquiring and communicating knowledge, primarily the instruments of language and number;
- 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—Biology as a science relies 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. It is the basis for our understanding of photosynthesis, blood and airflow, mutations, and energy pyramids in ecosystems. It underlies most of the instruments and techniques used by biologists: pH meters, spectrophotometers, thermometers, microscopes, centrifuges, computers, the use of radiation to induce mutations, and the use of radioactive tracers.

III. Biology Core Curriculum—Specialists working in well-circumscribed areas 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 the metabolic pathways by which energy is used. Cell biology examines the structure and function of cells in some depth. Genetics introduces students to mechanisms of heredity, including both molecular genetics and population genetics. Ecology, evolution, and behavior introduce students to populations, evolution, and the behavior of animals.

IV. Specialization in the Major—In addition to completing the required courses in biology, students take courses to expand on some aspects of biology. They may do so either by completing a biology major, which allows for more breadth in choosing electives, or by completing one of several department majors (biochemistry; ecology, evolution, and behavior; genetics, cell biology and development; microbiology; neuroscience; and plant biology). These more specialized majors each have required courses, as specified by the department. In addition to electives, most students will plan to complete



a research project in their special area of interest; each department offers credit for Directed Study (4993) and Directed Research (4994).

Recommended Related Coursework

The University offers a variety of life sciences courses in addition to those offered by CBS. In addition to courses offered by CBS, appropriate 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 (PIPa), 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—David Bernlohr, 624-2712, and Michael Sanders, 624-9637

Conservation Biology—Francesca Cuthbert, 624-1756

Ecology, Evolution, and Behavior—Elmer C. Birney, 624-6293

Genetic Counseling—Bonnie LeRoy, 624-7193

Microbial Engineering—Michael Sadowsky, 625-1722

Microbiology, Immunology, and Molecular Pathobiology—David Sherman, 626-0199

Molecular, Cellular, Developmental Biology, and Genetics—Perry B. Hackett, 624-6736

Neuroscience—John Soechting, 625-7961

Plant Biological Sciences—David Marks, 625-6737

Honors Program

The CBS honors program has two components. Freshmen and sophomores participate in the CBS/CLA lower division honors program, which is for students in all areas of arts and sciences. The program provides specially designed courses and opportunities for involvement in a mix of academic, social, and preprofessional cocurricular activities.

As juniors and seniors, CBS students are involved in a program designed around their interests in biology. This program recognizes and promotes outstanding academic achievement. The nucleus of the program is directed research in biology, the most significant and challenging

experience the faculty can offer qualified undergraduates. Another facet of the program is the CBS honors seminar, which provides exposure to the breadth of biological inquiry and allows honors students to get to know each other.

The honors experience culminates in the Undergraduate Research Symposium and honors dinner, which celebrate students' research accomplishments and academic achievements.

Honors Program Admission—Freshmen apply to the honors program when they apply to the University. Students may apply to the upper division CBS program at the end of the sophomore year. At least two semesters of honors registration must be completed to fulfill the requirements for graduation with honors. Applicants should have a 3.50 minimum GPA and present reasonable evidence of potential to attain the GPA required for graduation with honors (see below). Applications are available in 223 Snyder Hall.

Directed Research—This provides students with research experience and obtains 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 the major department), 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 are also 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
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 3960), 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

The 1995 National Research Council Report ranked the Department of Ecology, Evolution, and Behavior as one of the nation's top 15.

- a. an additional semester (2 credits) of participation in directed research
 - b. an 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 also consult the *CBS Student Handbook* and feel free to discuss questions with an Office of Student Services adviser, 223 Snyder Hall.

Graduation Requirements

To earn a B.S. 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 35 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.

Physical and biological sciences
 History and social sciences
 Arts and humanities
 Mathematical thinking
 Cultural diversity
 International perspectives
 Environment
 Citizenship and public ethics
 Writing skills

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. See specific requirements included with the description of each major beginning on page 86.

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 86.

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 an array of 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
 Professional Learning Experience Program (PLEP)
 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, design a research project, plan internships, or arrange to work with faculty in laboratory and field settings.

College of
 Biological Sciences

Find it

CBS students have access to an exciting array of individualized professional learning opportunities. The internship and research databases in the CBS Career Center (213 Snyder Hall) are great places to start.

Special Learning Opportunities and Resources

The CBS annual Career and Internship Fair brings in prospective employers representing the full range of career choices for CBS graduates.

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 obtain 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 is a unique course, organized and run by students, 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, too, whether on a field trip or studying together in the colloquium student room. Upper division biology majors gain important leadership and communication experience as colloquium leaders.

Freshman Seminars—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 Verna L. Holoman, 123 Snyder Hall (612-625-8752).

Professional Learning Experience Program (PLEP)—Offered by the CBS Career Center, PLEP 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 PLEP allows students interested in biology to begin career planning and exploration early in their academic careers.

Previous PLEP students have studied marine biology at marine institutes and local facilities, gained laboratory experience in private industry, studied animal behavior in northern Minnesota, and completed ecology studies in Costa Rica, to name a few projects.

Organizations sponsoring PLEP opportunities include educational institutions, government agencies, businesses, and nonprofit organizations. Both paid and volunteer positions are available throughout the year and some offer credit. Students with specific interests may design their own internship and PLEP will help them find a sponsoring organization. The CBS Alumni Society provides stipends each year for students who participate in unpaid internships. CBS students may receive 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). 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. The CBS Career Center maintains a research opportunities 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. Applications for all scholarships and awards are due March 15. For more information and applications, contact the Office of Student Services (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 vocations in the marketplace, most students select a biology major 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), students find that a biology major provides the right foundation to explore and prepare 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, veterinary medicine, osteopathy, physicians assistant, and optometry.

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, public education). CBS graduates have been unusually 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. Employers have come to realize that the University is a good place to find well-trained biologists as student interns and as employees. Some students are combining biology with other fields, such as engineering, graphic arts, or law. Those graduates who choose to continue their study are regularly admitted to top-notch graduate schools and professional programs.

About half of CBS graduates elect to pursue advanced study immediately after earning the B.S. degree (about 30 percent are admitted to professional schools and 20 percent enter graduate programs); the percentage of each graduating class that pursues advanced training increases over time. Details about follow-up studies of graduates, both bachelor of science and advanced, are available on request in 223 Snyder Hall.

Career Center—The CBS Career Center helps students explore the varied career options available to biology 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 Professional Learning Experience Program, annual Career and Internship Fair, and Alumni Career Network ensure that students make well-informed career decisions. Career Center staff also offer an annual course, Biol 2001—Careers in Biology.

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 specialized résumé distribution service. For more information, visit the center's Web site at <biosci.cbs.umn.edu/admin/student_services/>.

Students interested in teaching biology at the secondary level should consult the College of Education and Human Development for information about the specialized curriculum that is available.

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 Verna L. Holoman (612-625-8752).

Biochemistry Club—This club strengthens ties between biochemistry students and faculty, provides a source of individualized professional advice on career goals to each biochemistry major, helps undergraduates identify biochemistry labs for directed research, and helps students keep abreast of new advances in biochemistry. For more information, contact the Office of Student Services (612-624-9717) or the Department of Biochemistry, Molecular Biology and Biophysics (612-624-7760).

Biological Sciences Alumni Society (BSAS)—The society provides a professional association for biological sciences graduates and encourages relationships among current students, faculty, alumni, and the community. The society has made a special commitment to enhance opportunities for current students and encourages them to participate in all of its programs, often at discounted ticket prices. The president of the Biological Sciences Student Association serves on the board of directors of the alumni society. Alumni volunteers have cooperated with the CBS Career Center to develop the Career Information Network, an innovative program to help current students and graduates explore career options. The society sponsors undergraduate scholarships, undergraduate research and internship grants, and a mentor program. The society supports continuing education programs in the biological sciences. Student and alumni volunteers from the society have also assisted the college with student recruitment, especially of women and minorities. For more information, contact Paul Germscheid, CBS Alumni Relations, 123 Snyder Hall (612-624-3752), or the Minnesota Alumni Association, 200 Oak Street Suite 200, Minneapolis, MN 55455 (612-624-2323).

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).

Club Itasca—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 Club Itasca 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).

- 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 Biological Process Technology Institute.**
- 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).

Directory

(area code 612)

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Kathy Ball

Honors Program

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Franklin Barnwell

International Education

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Willard Koukkari

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Departments, Institutes, and Programs

Advanced Bioscience Computing Center

46 Gortner Laboratory of Biochemistry
(St. Paul)
625-9284

Alumni Relations

123 Snyder Hall (St. Paul)
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Paul Germscheid

Biochemistry, Molecular Biology, and Biophysics

140 Gortner Laboratory of Biochemistry
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James Fuchs, faculty adviser

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Genetics, Cell Biology, and Development

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Institute of Human Genetics

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625-1609

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Instructional Computing Center

406 Biological Sciences Center
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624-2789

Lake Itasca Program

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Plant Biology

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College of
Biological Sciences

College of Biological Sciences

Degree Programs

Biochemistry

Department of Biochemistry, Molecular Biology, and Biophysics
B.S.

Biochemists study molecules found in living organisms, particularly proteins, nucleic acids, lipids, and carbohydrates. The biochemistry major differs from the chemistry major in that biochemistry emphasizes the integration of chemical principles into biological processes from molecular genetics to enzymology.

The B.S. program in biochemistry prepares students for graduate study in biochemistry or a related biological science, medical or veterinary school, or entry-level biochemical 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—Directed Research and the Honors Program. Students should start planning the research component of their major program as early as possible and should make arrangements for their senior research project during their junior year, in consultation with their adviser.

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.

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 3211 and Biol 2005, Biol 3002 and Biol 3005, or Biol 3007

Biology Core—Complete each of the following:

BioC 4331—Biochemistry I: Structure, Catalysis and Metabolism in Biological Systems

Biol 4003—Genetics

Biol 4004—Cell Biology

Plus choose option a or b:

a. Biol/MicB 3301—Biology of Microorganisms

b. Choose one course or course pair from the following:
integrative/organismal biology/physiology area: Biol 2012, Biol 2022, Biol 3211 and Biol 2005, Biol 3002 and Biol 3005, Biol 3007, if not used to fulfill the general and organismal biology requirements listed above

or ecology/evolution/behavior area: Biol 3407 or Biol 3409 or Biol 3411

Biochemistry Courses—Complete each of the following:

BioC 3960—Research Topics in Biochemistry

BioC 4025—Laboratory in Biochemistry

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 laboratory experience).

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 1201-1202—General Physics I-II

or Phys 1301-1302—Introductory Physics I-II

Note: Grades in all chemistry, math, physics, biochemistry and biological sciences courses taken to complete requirements in the major must be at least C-.

Minor Requirements

Students must complete BioC 4331, 4332, and 4025.

Biology

B.S.

Students in this major develop the skills necessary to tackle complex problems within the biological sciences. Biology examines the fundamental concepts of nature and all aspects of the living environment, from the molecular level to the biosphere. Biology can open doors to many specialized fields, including genetics, biotechnology, environmental biology, and medicine.

The biology B.S. program can prepare 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.

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/MicB/VPB 2032, Biol 2012, Biol 2022, Biol 3211 and Biol 2005, Biol 3002 and Biol 3005, Biol 3007, Biol/MicB 3301

The annual Biology Week celebration features student organizations at the activities fair kick-off event.

Sequence B.

Biol 1009—General Biology

Choose two organismal biology courses or course pairs from the following list: Biol/MicB/VPB 2032, Biol 2012, Biol 2022, Biol 3211 and Biol 2005, Biol 3002 and Biol 3005, Biol 3007, Biol/MicB 3301

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry

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 3005, Biol 3007, or Biol/MicB 3301, if not used to satisfy the general and organismal biology requirement.

Biol/Nsc 3105 and 3115, Biol 4125, BioC 4025, BioC 4794W/4994**, EEB 4014, 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**, Nsc 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

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

*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.

Note: Grades in all chemistry, math, physics, and biological sciences courses used 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.

Minor Requirements

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 for the Minor

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 (Biol 4794W or Biol 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 3005—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

Laboratory /field course options (if not used for organismal requirement):

BioC 4025—Laboratory in Biochemistry

BioC 4794W or 4994*—Directed Research

Biol 3002—Plant Biology Function

and Biol 3005—Plant Function Laboratory

Biol 3007—Plant Biology: Diversity and Adaptation

Biol/Nsc 3105 and 3115—Neurobiology Laboratory I and II

Biol 3211—Animal Physiology

and Biol 2005—Animal Diversity Laboratory

Biol/MicB 3301—Biology of Microorganisms

Biol 4125—Recombinant DNA Laboratory

EEB 4014—Ecology of Vegetation

EEB 4016—Ecological Biogeography

EEB 4129—Mammology

EEB 4134—Ornithology

EEB 4136—Ichthyology

EEB 4605—Limnology Laboratory

EEB 4994 or 4974*—Directed Research

GCD 4015—Genetics Laboratory

GCD 4025—Cell Biology Laboratory

GCD 4111—Histology: Cell and Tissue Organization

GCD 4794W or 4994*—Directed Research

MicB 4215—Advanced Laboratory: Microbial Physiology and Diversity

MicB 4235—Advanced Laboratory: Virology, Immunology and Microbial Genetics

MicB 4794W or 4994*—Directed Research

Nsc 4794W or 4994*—Directed Research

PBio 4404—Developmental Plant Anatomy

PBio 4511—Flowering Plant Systematics

PBio 4794W or 4994*—Directed Research

PBio 5416—Plant Morphology, Development and Evolution

* Must complete at least 2 credits of research (4994 or 4974) in one lab to use for a lab requirement. 4974 is directed research with a Writing Intensive component.

All x8xx Lake Itasca Field Station courses satisfy field requirement

Ecology, Evolution, and Behavior

Department of Ecology, Evolution, and Behavior

B.S.

This program brings together the conceptually linked fields of ecology, evolution, and behavior.

Ecology examines the growth and maintenance of populations and their interactions in communities, and interrelationships 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 3005, 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—Complete each of the following:

Six credits of EEB-designated courses at the 4xxx level or above (the third course from the biology core, category B above may be used to fulfill this requirement)

At least 3 credits of biological sciences courses at the 3xxx level or above. Other physical, mathematical, or computer science credits may be substituted with adviser's permission if they are not used to fulfill the requirements for general and organismal biology and biology core categories listed above.

Biology field experience. This can be satisfied with a 4-credit course involving extensive field experience taken at the Lake Itasca Forestry and Biological Station or equivalent.

Required Courses From Other Programs

Math 1271-1272 or 1281-1282—Calculus I-II

Stat 3021—Introduction to Probability and Statistics

Chem 1021-1022—Chemical Principles I-II

Chem 2301-2302—Organic Chemistry I-II. Students with special interests in physical sciences or math may replace Chem 2302 with a course from this list: EEB 4631, Geo 4701, Geo 4703, Geog 3421, Math 2243, Math 4242, Math 4567, 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.

This program prepares undergraduates for advanced study and careers in the rapidly growing field of biotechnology and in medical, industrial, or other scientific laboratories.

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.

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/MicB/VPB 2032, Biol 2012, Biol 2022, Biol 3211 and 2005, Biol 3002 and 3005, Biol 3007, Biol/MicB 3301

Sequence B.

Biol 1009—General Biology

Two organismal courses or course pairs from the following list: Biol/MicB/VPB 2032, Biol 2012, Biol 2022, Biol 3211 and 2005, Biol 3002 and 3005, Biol 3007, Biol/MicB

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry

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, Psy 5137

At least one course in cell biology from GCD 4036, GCD 4111, GCD 4134, MicB 4131, PBio 5414

At least one course in developmental biology from GCD 4151 or GCD 4161 or PBio 5416

One laboratory course from the following: BioC 4025, Biol 4125, GCD 4015, GCD 4025, GCD 4111, MicB 4235

At least 2 credits of GCD 4794W or 4994—Directed Research. At least 2 credits and a maximum of 6 credits of GCD 4794W/4994 may be applied toward the 18-credit total.

Biol 3700 is recommended.

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: 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.

Microbiology

Department of Microbiology

B.S.

This program prepares students for work as practicing microbiologists or for graduate study.

The field of microbiology embraces many areas of fundamental and applied research. These include the basic role of microbes, such as bacteria, fungi, and viruses, and basic biological mechanisms involving microorganisms such as DNA replication or regulation of protein synthesis. Microbiologists study fundamental issues of human and animal diseases such as the mechanisms of viral and bacteriological infection, immunity, autoimmune disease, and viral-induced cancer.

Award-winning
teachers and
advisers are a
tradition in CBS.
The college currently
has 12 Morse-Alumni
Outstanding
Undergraduate
Teachers and five
John Tate
Undergraduate
Advising Award
winners.

Areas of agricultural research include fungal and bacterial symbionts essential for maximum growth of organisms required for natural soil fertility. Microbiologists also work in industrial and pharmaceutical fields involving production and discovery of new antibiotics; manufacture of cheese, beer, wine, and other foods; pasteurization in canning and food processing; and even decontamination of space vehicles.

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.

General and Organismal Biology—Choose sequence A or B:

Sequence A. (preferred)

Biol 1001-1002—Introductory Biology I-II

Sequence B.

Biol 1009—General Biology

Choose one of the following course pairs: Biol 3211 and Biol 2005, or Biol 3002 and 3005

Biology Core—Complete each of the following:

Biochemistry courses: Biol/BioC 3021 or BioC 4331

Genetics courses: GCD 3022 or 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 4141, 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

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 1301-1302—Introductory Physics I-II

or Phys 1201-1202—General 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.

Neuroscience

Department of Neuroscience

B.S.

Neuroscience seeks to understand the brain and behavior, and how we perceive, move, think, and remember. Important aspects of behavior can be examined at the level of individual nerve cells, their properties, and the ways they communicate with one another. Many of these basic issues can be studied directly at the molecular level.

The neuroscience major is designed to provide an introduction to these basic areas of investigation by emphasizing the interdisciplinary nature of the subject.

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.

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 2005—Animal Diversity Laboratory

Biol 3211—Animal Physiology

or Phsl 3051—Human Physiology

Sequence B.

Biol 1009—General Biology

Biol 2005—Animal Diversity Laboratory

Choose Biol 3211—Animal Physiology

or Phsl 3051—Human Physiology

Choose one organismal course or course pair from the following list:

Biol/MicB/VPB 2032, Biol 2022, Biol 3002 and 3005, 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/NSc 3101—Introduction to Neuroscience I: From Molecules to Madness

Biol/NSc 3102—Introduction to Neuroscience II: Biological Basis of Behavior

Biol/NSc 3105-3115—Neurobiology Laboratory I-II



At least 2 credits of Track 1 or 2

Track 1: NSc 4794W/4994—Directed Research

Track 2: NSc 4793W/4993—Directed Studies

Students in Track 2 must also choose one laboratory or field course from the following list (these lab courses may not be used to satisfy requirements for the general and organismal biology requirement listed above):

Biol 3002 and 3005; Biol 3007; Biol/MicB 3301; Biol 4125; BioC 4025; BioC 4794W/4994; EEB 4014; EEB 4016; EEB 4129; EEB 4134; EEB 4136; EEB 4605; EEB 4607; EEB 4631; EEB 4794W/4994; GCD 4111; GCD 4015; GCD 4025; GCD 4794W/4994; MicB 4215; MicB 4235; MicB 4794W/4994; PBio 4321; PBio 4404; PBio 4511; PBio 5416; PBio 4794W/4994; any 38xx or 48xx CBS course offered at the Lake Itasca Forestry and Biological Station.

Electives in the Major

Choose at least 12 credits from groups A-D from the following list, with at least one course from each group:

Group A—Cell and molecular neurobiology

NSc 4151, NSc 5461, BioC/Phsl 5444

Group B—Sensory and motor systems

EEB 5323, NSc/Psy 5031, NSc/Psy 5034, NSc/Ent 5481, Psy 3031, Psy 5036, NSc/Psy 5037, Psy 5038

Group C—Behavior

Biol 3411 (if not used to fulfill the biology core requirements listed above), EEB 5321, EEB 5327, NSc 5661, Psy 3051, Psy 3061

Group D—History and philosophy of science

HSci 3211, HSci 3242, Phil 3601, Phil 4607

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: 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.

Plant Biology

Department of Plant Biology

B.S.

Teaching and research programs in the Department of Plant Biology include molecular, biochemical, cellular, developmental, physiological, organismal, ecological, and evolutionary biology of plants, algae, and fungi.

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 who are attracted to 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.

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 1002—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 4003—Genetics

or Biol 4004—Cell Biology

Biol 3407—Ecology

or Biol 3409—Evolution

or Biol 3411—Introduction to Animal Behavior

Laboratory or Fieldwork

Choose two courses from the following list. These courses may not be used to satisfy requirements listed above for general and organismal biology, but may be used to fulfill the requirements for electives in the major, listed below.

Biol/MicB 3301; Biol/NSc/Phsl 3105 and 3115; Biol 4125; BioC 4025; BioC 4794W/4994; EEB 4014; EEB 4016; EEB 4129; EEB 4134; EEB 4136; EEB 4605; EEB 4607; EEB 4631; EEB 4794W/4994; GCD 4111; GCD 4015; GCD 4025; GCD 4794W/4994; MicB 4215; MicB 4235; MicB 4794W/4994; NSc 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 (x8xx).

Electives in the Major

Choose three courses from the following list, with at least one course each from Group A (integrative and organismal biology) and Group B (cellular and subcellular biology). The two additional courses taken by a student who uses PBio 5412 to partially fulfill this requirement must be from different groups. Other appropriate courses may be substituted by petition.

Group A (integrative and organismal biology)

PBio 4321—Taxonomy of Minnesota Flora

or PBio 4511—Flowering Plant Systematics

PBio 4404—Developmental Plant Anatomy

PBio 5412—Plant Physiology

PBio 5416—Plant Morphology, Development and Evolution

EEB 4014—Ecology of Vegetation

or EEB 5122—Plant Interactions with Animals and Microbes

Group B (cellular and subcellular biology)

PBio 5412—Plant Physiology

PBio 5414—Plant Cell and Molecular Biology

or PBio 5640—Discussions in Plant Molecular Biology

BioC 5401—Advanced Metabolism and its Regulation

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: 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.

Minor Requirements

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

College of Continuing Education

This is the College of Continuing Education
section of the 2000-2002 University of
Minnesota Undergraduate Catalog.

CCE

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*College of
Continuing Education*



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; for more specific information regarding admission to a particular degree program, please consult the relevant areas in this section describing each program, and contact the appropriate advising office. CCE degree programs admit at the upper division level only. For general questions about admission to CCE degree or certificate programs, contact CCE Student Support Services at 612-624-4000.

Liberal Education Requirements—Within CCE, the Inter-College Program (ICP) and the Program for Individual Learning (PIL) follow the University's standardized set of liberal education requirements. The Applied Partnership Degrees have liberal education requirements unique to each degree program. Please contact a student support service adviser for requirement information.

Degrees

Students have two broad options for earning baccalaureate degrees through CCE—individualized degrees or partnership degrees. 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 and to arrange to attend a First Step meeting.

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 will also consider qualified students who can commute to campus for some learning activities. The program also attempts to serve former University students who live outside the region. For more information, call 612-624-4020 to arrange to attend an information session. You can also e-mail pil@tc.umn.edu to find out more.

Bachelor of Applied Science (B.A.S.) Degrees

Students may also consider one of five majors within the B.A.S. degree offered in partnership with area community colleges and designed for career-minded adults: applied business, information networking, network administration, emergency health services, or construction management.

The B.A.S. with a major in applied business is an upper division, practitioner-oriented business program. Designed for adults who want education to enrich their lives and careers, the major allows students to develop skills and knowledge usable in their current work environments as they build toward a degree. The curriculum was developed after careful consultation with employers and provides the background education sought by employers when they make hiring and promotion decisions. Applied business instructors regularly bring private-sector work experience to their teaching, as well as a strong academic background.

Offered in partnership with six local Twin Cities community colleges, students can complete lower division pre-applied business courses in the evening at these convenient sites and at the University of Minnesota. Many pre-applied business courses can be taken from any location through distance education. An associate's degree in business from an accredited community college or university usually meets most of the admission requirements.

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Continuing Education

Find it

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.

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.

The upper division courses (listed with the "ABus" designator) in the applied business program provide a balance of solid theory and hands-on application of course concepts. The program revolves around a learning community of goal-oriented adult students who bring work experiences to the classroom. ABus courses are offered in the evenings and on Saturdays at convenient metropolitan sites, including community colleges and the University. Most courses in the program are available through distance education (beginning spring 2000).

For more information, call CCE Student Support Services at 612-624-4000 or e-mail bas@cce.umn.edu.

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. For more information, contact CCE Student Support Services at 612-624-4000 or e-mail bas@cce.umn.edu.

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. For more information, contact CCE Student Support Services at 612-624-4000 or e-mail bas@cce.umn.edu.

The B.A.S. with a major in information networking is offered in conjunction with North Hennepin Community College in Brooklyn Park. The University offers the upper division courses and awards the degree; North Hennepin offers lower division and prerequisite courses and is the site for most of the program courses.

This major is an interdisciplinary blend of computer science, management of information systems, liberal arts, science and engineering, and practical hands-on experience. Students will 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. For more information, call CCE Student Support Services at 612-624-4000 or e-mail bas@cce.umn.edu.

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 Inver Hills Community College, Inver Grove Heights. For more information, call CCE Student Support Services at 612-624-4000 or e-mail bas@cce.umn.edu.

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. See separate college sections in this catalog for more information and specific program requirements.

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
- Alcohol and Drug Counseling Education
- Business Administration
- Cardiovascular Perfusion Technology
- Child Abuse Prevention Studies
- Civil Engineering
- Computer Science
- Electrical and Computer Engineering
- Engineering and Science
- Information Networking (pending approval)
- Liberal Arts
- Mechanical Engineering
- Ophthalmology Technician
- Organizational and Professional Communication
- Orthoptics Study
- Radiation Therapy
- Scientific and Quantitative Methods

Honors

All CCE degree programs recognize outstanding academic achievement by offering an honors option for graduating students. Other collegiate units determine academic achievement criteria for their four-year degrees. See "Honors" in individual college sections of this catalog and contact the specific program for more information on honors options.

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.

Advising

CCE Student Support Services—The CCE Student Support Services office offers academic advising and financial aid advising free of charge to all students interested in CCE, it's 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 612-624-4000 or e-mail adv@cce.umn.edu.

Special Learning Opportunities and Resources

Independent and Distance Learning (IDL) provides a wide array of University courses using mail and electronic technologies to meet the needs of adult and part-time students who cannot or choose not to attend classes on a university campus. Using textbooks and a study guide, combined with self-motivation and written feedback from a University instructor, students can earn college credits from home.

Nearly all IDL courses are available by correspondence through the U.S. mail. A growing number of courses provide the option of electronic-mail lesson exchange. More courses are being offered on the Internet, where students submit assignments and interact with an instructor and other students online. Many other courses include audio tapes, videotapes, and computer disks. There is no admission requirement to register for IDL courses. Most courses are self-paced, allow up to nine months to complete the coursework, and allow year-round registration.

Students may register by fax, mail, or in person. Credits earned through IDL coursework are recorded on a regular transcript and can be applied toward liberal education and/or major program requirements in most University undergraduate programs and all CCE certificate or degree programs. IDL courses can also satisfy residency requirements, with approval from colleges.

For information on courses, policies, and registration, request an *Independent and Distance Learning Catalog* by e-mail at catalog@cce.umn.edu or by calling 612-624-4000 or 1-800-234-6564. Information is also available at indstudy@tc.umn.edu or visit the online catalog, which contains an up-to-date and complete listing of courses, at www.cce.umn.edu.

Independent Study (UC 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 UC 3075—Independent Study. For more information, contact ICP at 612-624-2004.

Scholarships

The College of Continuing Education Student Support Services administers the Tuition Assistance Grant Program and eight scholarship programs for CCE students, provides information to CCE students about other financial aid options, and collaborates with the University's Office of Scholarships and Financial Aid to deliver aid to students enrolled in Independent and Distance Learning term-based correspondence courses.

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. Priority is given to part-time students. 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, contact CCE Student Support Services at 612-624-4000 or e-mail adv@cce.umn.edu.

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Continuing Education



Student Organizations

The College of Continuing Education Student Board provides a forum for CCE students, faculty, and administration to exchange ideas and information. The board is composed of CCE students, the Dean of the College of Continuing Education or a designated representative, and two faculty or CCE staff members. All students are encouraged to communicate ideas, suggestions, and concerns to the CCE Student Board by calling 612-626-8501 to leave a voice-mail message for referral to a board member.

Eligibility for board membership—Students interested in election to the board must have earned at least 12 CCE credits in the last five years and must be enrolled for a minimum of 3 CCE semester or special-term credits. Interested students should call 612-626-8501 to notify the board of their wish to join; those interested must then attend two regular board meetings within a 12-month period. At the third regular board meeting attended, the student is eligible to be appointed to the board.

Terms for student members of the CCE Student Board run for one year, beginning on May 15 and ending on the following May 15.

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
<www.cce.umn.edu>

Administrative Offices

Office of the Dean
201 Coffey Hall
St. Paul, MN 55108
624-5332
Gail Skinner-West, interim 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

Applied Degree Programs
626-8348

Personal Enrichment Programs
625-7777

Departments and Programs

Bachelor of Applied Science (BAS)

- Applied Business
- Business Construction Management
- Information Networking
- Network Administration
- Emergency Health Services

101 Wesbrook Hall
Minneapolis, MN 55455
624-4000
E-mail: bas@cce.umn.edu
<www.cce.umn.edu>

Inter-College Program (ICP)

107 Armory Building
Minneapolis, MN 55455
624-2004

Josh Borowicz, interim program director, 624-2004

Program For Individualized Learning (PIL)

107 Armory Building
Minneapolis, MN 55455
624-4020

Mary Sue Simmons, interim program director, 624-4020, 624-8879
E-mail: pil@tc.umn.edu
<www.pil.umn.edu/>

Organizations

College of Continuing Education Student Board
626-8501

College of Continuing Education

Degree Programs

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 21 upper division credits in one area and 15 in each of the other two.
- A **thematic** cross-college program, such as "Aging Studies," that 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. 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 will include 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

Based on the most recent survey of the National Research Council, the scholarly quality of the University of Minnesota's faculty ranks among the top 10 public institutions in the nation.

document will identify 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 will 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 Scholarships and Financial Aid, 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 will 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 the Twin Cities liberal education requirements.

Students admitted to the University before fall 1994 must fulfill an earlier set of ICP liberal education requirements, available from the ICP office.

ICP students must also complete one lower division and one upper division composition course or two writing intensive courses at the upper division level, and one course in oral communication. B.A. students must also complete two years of college study (or equivalent) in a second language.

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 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 one semester.
- 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 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: A) primary area studies, B) major project, and C) extended studies in the area of concentration.

Criterion A: Primary Area Studies (B.A. and B.S.)—

Through learning activities in their primary area studies, students will 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 will 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 will complete learning activities that bring a broader perspective to their area of concentration. These studies will 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 will comprise 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 will 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 will 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 will involve knowledge of how social scientists describe and analyze human experiences and behavior; study of the interrelationships among individuals, institutions, structures, events, and ideas. These studies will involve understanding approaches to the human condition through works of art, literature, and philosophy; knowledge of how artists create and humanistic scholars think; and the ability to make aesthetic judgments.

Criterion 3: Historical Perspective—Studies will involve historical perspective through understanding the roles of individuals and groups in their historical, cultural, social, economic, and political worlds.

Criterion 4: Mathematical Thinking—These studies will 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—These studies will involve examining communication theory and skills (excluding written communication in English). 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—These studies will 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—These studies will 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 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
- II. International Perspectives
- III. Environment
- IV. Citizenship and Public Ethics
- V. Creation of Meaning

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 program will include 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 will read across many disciplines. As part of the PIL program, students will also be 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. Note that CCE credits are attached to all registrations in the program.

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 will help students develop an area of concentration and select appropriate learning activities. The area specialist will also help the student plan and execute the major project and will help 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.

UC 3211. Degree Planning Seminar—(8 credits)

During this class, 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 will 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 will register in the program for the following types of activities:

UC 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 UC 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.

UC 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 will 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 will require separate registration and tuition. Tuition and fees for other credit-based learning activities will 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.

UC 3291. Graduation Preparation—(8 credits)

During the time students register for graduation preparation, they will finish their graduation dossiers, demonstrating completion of requirements for a bachelor's degree. The dossier will include 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 will provide a preliminary review of the dossier to ensure that graduation criteria have been met.

UC 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 for assessment by a graduation review committee, which will vote on a recommendation to award the baccalaureate degree.

UC 3200. Continuing Studies—(1 credit)

Students may register for this course if they are working with an adviser on an incomplete PIL registration, or have no other registrations but are conducting independent research.

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 will be expected to attend seminars and establish a pattern of regular visits with advisers on campus. Those few students admitted who 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

Applied Business

B.A.S.

This practitioner-oriented degree is designed for adult and part-time students. Courses address real-world business issues and relate workplace skills to student experience. Degree requirements reflect a practical orientation, and courses are designed and scheduled primarily in the evening for working adults.

Students who have completed an A.S. degree in business at an accredited school can pursue a more advanced applied business degree at the University. Applied business courses are offered at campuses of area community colleges and the University; community colleges offer courses that may fulfill all lower division admission requirements. Lower division courses may also be completed through registration in evening or Independent and Distance Learning (correspondence) courses.

Admission Requirements—Students must complete the following requirements:

- Lower division coursework totaling 50-63 semester credits in the areas of economics, communications, mathematics, statistics, accounting, marketing, human relations, computer science, and other general education courses. Lists of eligible courses are available from B.A.S. academic advisers. Coursework may be completed at the University of Minnesota or through curricula for an A.S. degree in business from an accredited school.
- Minimum GPA of 2.20.
- Three years of work experience.

Degree Requirements

Students must complete at least 120 credits, including at least 57 credits in the major. Applied business students are admitted as advanced-standing students.

Required Courses

Students must complete 45 credits in the following courses:

- *ABus 4011—Historical Perspectives and Contemporary Business Challenges
- *ABus 4012—Problem Solving in Complex Organizations
- *ABus 4021—Small Group Behavior and Teamwork
- *ABus 4022—Managing Organizational Relationships
- *ABus 4023—Communicating for Results
- *ABus 4031—Accessing and Using Information Effectively
- *ABus 4032—Quantitative Skills for Decision Making
- *ABus 4041—Leadership in a Global and Diverse Workplace
- *ABus 4042—Planning and Implementation at the Business Unit Level
- *ABus 4043—Project Management in Practice
- *ABus 4101—Accounting and Finance for Managers
- *ABus 4102—Operations in Manufacturing and Service Businesses
- *ABus 4103—Marketing and Sales
- *ABus 4104—Management and Human Resource Practices
- *ABus 4999—Practicum

Students must also complete 12 additional credits (four upper division courses at 3 credits each). Lists of eligible courses are available from B.A.S. academic advisers.

Final Project

*ABus 4999—Practicum is required in the term preceding graduation.

* Check for online availability.

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 overall 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 “building 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.

In addition, students must also complete 18 lower division credits during their academic program. These credits may be completed through coursework approved by a B.A.S. adviser or through curriculum for the A.S. in Construction Management at a community college.

Degree Requirements

Students must complete at least 120 credits, including at least 58 credits in the major.

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

Business and Management

ABus 4101—Accounting and Finance for Managers
 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 4023—Construction Estimating

Communication

*ABus 4012—Problem Solving in Complex Organizations
 *ABus 4023—Communicating for Results
 *ABus 4031—Using and Accessing Information Effectively

Science and Engineering

CE 4101—Project Management
 CMgt 4023—Value Engineering
 CMgt 4030—Construction Safety
 Geo 1001—The Dynamic Earth: An Introduction to Geology

Architecture

Arch 5542—Building Energy Systems
 Arch 5550—Topics: Structural Frames and Building Design/
 Construction
 Arch 5550—Topics: Integrated Design Systems
 CE 4180—Environmental and Material Forces in Architecture

Electives

Twelve credits of elective courses selected in consultation with a B.A.S. adviser. One of the courses must fulfill the University's liberal education requirements for cultural diversity.

Final Project/Internship

CMgt 4196—Construction Management Internship
 *Check for online availability.

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—Theory and Practice of Occupational Health
 PubH 5663—Cross-Cultural Health Issues

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 Practicum
 *ABus 4012—Problem Solving in Complex Organizations
 or OMS 3059—Quality Management
 *ABus 4022—Managing Organizational Relationships
 or Mgmt 3001—Fundamentals of Management
 OMS 3001—Introduction to Operations Management
 PubH 5771—Health Care Financial 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 in the following courses:

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, BIE/HRD 5629, CI 5133
 Choose 3 credits from: BIE/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 North Hennepin Community College (NHCC), Brooklyn Park, MN. Approximately 60 credits of lower division requirements can be completed in residence at NHCC.

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 credits of the designated prerequisites, including Math 1271, 1272, 2243; Phys 1301, 1302; CSci 1901, 1902, and 2021. A minimum overall GPA of 2.60 is required for prerequisite courses.

College of
Continuing Education

Find it



Check the

CCE Web site at

<www.cce.umn.edu>

for more information

about the B.A.S.

degrees.

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 new programs and services.

Degree Requirements

Students must complete at least 120 credits including 45 credits in prerequisites and 51 credits in the major.

Students must also complete 27 credits of electives with the following distribution: 3 credits in the social sciences; 6 credits in the arts or humanities; 6 credits at the 4xxx or 5xxx level in computer science, electrical and computer engineering, information and decision sciences, applied business, or rhetoric; and 12 credits at any level and in any discipline.

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 96 credits from the following:

ABus 4021—Small Group Behavior and Teamwork
 ABus 4023—Communicating for Results
 ABus 4043—Project Management in Practice
 Acct 2050—Financial Reporting
 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 4081—Introduction to Software Engineering
 CSci 5131—Internet Programming
 CSci 5211—Data Communications and Computer Networks
 CSci 5212—Network Programming and Administration
 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
 or Rhet 1101—Writing to Inform, Convince, and Persuade
 or Rhet 1152—Writing on Issues of Science and Technology
 IDSc 4102—Introduction to Information System Analysis
 IDSc 4153—Telecommunications: Domestic and International Policy and Regulation
 Math 1271—Calculus I
 Math 1272—Calculus II
 Math 2243—Linear Algebra and Differential Equations
 Phys 1301—Introductory Physics I
 Phys 1302—Introductory Physics II
 Psy 1001—Introduction to Psychology
 Spch 1101—Introduction to Public Speaking
 or Rhet 1223—Oral Presentations in Professional Settings
 or Rhet 3257—Scientific and Technical Presentations
 Stat 3011—Introduction to Statistical Analysis

Final Project

Students are encouraged to complete an internship during their final year in the program.

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 Inver Hills Community College (IHCC), Inver Grove Heights. Approximately 60 credits of lower division coursework can be completed in residence at IHCC.

Admission Requirements—To be considered for admission to the program, students must complete a total 45 semester credits including the required prerequisite courses. Required prerequisites include; logic, statistics, calculus, physics I and II, Introduction to Networking, Introduction to Microcomputer Operating Systems, Computer Programming with C++, Algorithms and Data Structures and Visual Basic or Java Programming. A minimum overall GPA of 2.60 is also required.

Degree Requirements

The curriculum contains lower and upper division courses in three broad areas: general education, business, and technical. In total there are 120 credits of required and elective courses; 18 credits in required general education courses, 41 credits in required business courses, and 47 credits in required technical courses.

Of the remaining 14 elective credits, students must take at least 6 credits in upper division business or technical courses in one selected area of specialization. Three areas of specialization are defined: networking, software, and database management.

Required Courses

(All 1xxx courses are taken at Inver Hills Community College)

*ABus 4021—Small Group Behavior and Teamwork
 *ABus 4023—Communicating for Results
 *ABus 4032—Quantative 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
 Bus 1131—The Legal Environment of Business
 CS 1104—Introduction to Networking
 CS 1106—Introduction to Microcomputer Operating Systems
 CS 1119—Computer Programming with C++
 CS 1122—Algorithms and Data Structures
 CS 1114—Visual Basic or CS 1126 Java Programming
 CSci 4061—Introduction to Operating Systems
 CSci 5211—Data Communications and Computer Networks
 CSci 5212—Network Programming and Administration
 CSci 5980—Special Topics in Computer Science
 Econ 1105—Macroeconomics
 Econ 1106—Microeconomics
 English 1108—Writing and Research Skills
 English 1111—Research Writing in the Discipline
 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
 Math 1114—Introduction to Calculus
 Phil 1120—Logic
 Phys 1041—Introduction to Physics I
 Phys 1042—Introduction to Physics II
 Speech 1100—Interpersonal Communication
 WCFE 5011—Technology and Public Ethics
 One course in humanities, music, theatre, art, or literature taken at either location
 One course in sociology or psychology taken at either location
 Specialization—Students must take 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.

* Check for online availability.

Electives

Students take 6 credits in any discipline at any time.

Dental Hygiene

This is the Dental Hygiene section of
the 2000-2002 University of Minnesota
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*Dental
Hygiene*



Program in 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 dental hygiene curriculum consists of the preprofessional program in the College of Liberal Arts (CLA), or its equivalent at some other regionally accredited institution, and the professional program in the School of Dentistry Division of Dental Hygiene.

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 curriculum in dental hygiene consists of the preprofessional program in CLA or its equivalent at another regionally accredited institution and the professional program in the 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 March 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 or Status* 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 <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,

Dental
Hygiene

Find it

Additional

information about

the School of

Dentistry can be

found at

<www.umn.edu/

dental>.

320 16th Avenue S.E., University of Minnesota, 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 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.

One hundred percent of the 1999 dental hygiene graduates found employment as dental hygienists within two weeks of graduation.

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 and tuberculin test or chest X-ray 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 Committee. Students' work is considered unsatisfactory when they earn less than a "C" grade average (2.00 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 Dental Hygiene Office at 612-625-9121.

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: 612-626-6096, or e-mail thomp034@tc.umn.edu. In addition, the division works closely with CLA's pre-health science advisers in 30 Johnston Hall at 612-624-9006.

The dental hygiene program is the only program in Minnesota that grants a baccalaureate degree and is affiliated with a school of dentistry.

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 are required to 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.

Minority Program—The Academic Health Center's Multicultural Institute is committed to the recruitment and retention of minority persons who come from groups underrepresented in the health professions. At the undergraduate level, the program provides summer enrichment programs and a pre-health sciences minority student organization. Advising and special courses are also offered through the Martin Luther King Program.

The Multicultural Institute is in 1-125 Moos Health Sciences Tower, 515 Delaware Street S.E. (612-624-9400).

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 can 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.

Directory

(area code 612)

Administrative Offices

Office of the Director

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Director and associate professor
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Student Services and Advising

Karen Smith, Admissions Secretary
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515 Delaware St. S.E.
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Fax: 626-6096
E-mail: smith093@tc.umn.edu

School of Dentistry Web Page

<www.umn.edu/dental>

Program in 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.

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 2232—General and Oral Pathology
 DH 2235—Oral and Maxillofacial Radiology
 DH 3111—Biomaterials for the Dental Hygienist
 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 3224—The Dental Hygiene Care Process: Clinical Application IV
 DH 3227—Oral and Maxillofacial Radiology: Clinic II
 DH 3231—Research Methods in Dental Hygiene
 DH 3235—Dental Hygiene Care for Special Needs Patients: II
 DH 4125—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 4132—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
 Phs1 3051—Human Physiology

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 3231—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

Initiated in 1919, the dental hygiene program at the University of Minnesota was the fourth in the nation.



College of Education and Human Development

This is the College of Education and Human
Development section of the 2000-2002 University
of Minnesota Undergraduate Catalog.

CEHD

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*College of
Education and Human
Development*



College of Education and Human Development

General Information

The College of Education and Human Development (CEHD) consists of six departments: child psychology; curriculum and instruction; educational policy and administration; educational psychology; kinesiology and leisure studies; and work, community, and family education. Classrooms, offices, and more than 20 research and service centers occupy six buildings on the Minneapolis campus and one building on the St. Paul campus. Founded in 1905, the college has about 700 undergraduate students, 2,500 graduate students, and 128 faculty.

CEHD's mission is to generate knowledge about teaching, learning, and human development and apply that knowledge 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 roles and requirements of educators and human development professionals have expanded dramatically in the past decade. Administrators, practitioners, and researchers must have 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. Some undergraduate programs admit students fall and spring semesters; others admit students once per year.

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

Students transferring to CEHD from other University of Minnesota colleges must submit an Application for Change of College or Status to the Office of the Registrar—Minneapolis, 200 Fraser Hall or 130 West Bank Skyway; St. Paul, 130 Coffey Hall. Students transferring from other colleges or universities should see "Transfer Admission" in the General Information section of this catalog.

In addition to the above step, *students applying for majors* in foundations of education; elementary; kinesiology; recreation, park, and leisure studies; and sport studies must complete the following step by the program application deadline:

Submit SPS application materials to Student & Professional Services, 110 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455.

The program application deadline may be found on the Web at <www.coled.umn.edu>, or contact a Student & Professional Services adviser.

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.), certificates, initial teacher licensure, master of education (M.Ed.), and endorsement. The Graduate School offers the 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—Train and supervise others in industry and business or teach vocational and technical education in technical colleges. If students want to teach in public schools, this major is the foundation for the M.Ed./initial licensure program in business and industry education.

Child Psychology—See College of Liberal Arts section.

Foundations of Education—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/occupational therapy, athletic training, medicine, and nursing.

Music Education—See College of Liberal Arts 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.

Minors

Two minors are available: coaching and undergraduate leadership. The coaching minor is available to students admitted to a B.S. degree program in the college's School of Kinesiology and Leisure Studies. 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 higher). For more information, call the Office for Student Development 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 (in some specialized curricula the number of credits is more than 120) with a C (2.00) average, including the specified coursework in psychology (minimum grade of C-) and writing, is required for graduation. 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 should apply for a degree at 200 Fraser Hall at least one semester before they expect to graduate. In addition, students whose major fields are agricultural education, business and industry education, human resource development, kinesiology, or recreation, park, and leisure studies must file an adviser-approved program with the college's Student Scholastic Standing Committee.

Certification/Licensure

Certification

The college offers five certificates at the undergraduate level: coaching, sport management, human resource development, technical education, and disability policy and services. For more information about the certificates in coaching and sport management, contact the School of Kinesiology and Leisure Studies (612-625-5300). For more information about the certificate in human resource development, contact the Department of Work, Community, and Family Education (612-624-1221). For information about the certificate in technical education, call WCFE (612-624-1700). For information about the certificate in disability policy and services, call the Institute on Community Integration (612-624-6830).

Licensure

To teach in a public classroom, students must be licensed by the state. Except for the B.S. in agricultural education, all CEHD initial teacher 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 agricultural education, art education, business education, early childhood education, elementary education, English education, family education, mathematics education, physical education, science education, second languages and cultures education (including English as a second language), social studies education, and technology 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 complete specific competencies. This requirement is met through a combination of required and elective coursework at the graduate level. Candidates also must pass or meet minimum standards on the Praxis I: Pre-Professional Skills Tests (PPST), which assess basic skills in reading, writing, and mathematics. Minnesota state law also requires all initial licensure applicants to be fingerprinted and pass national background checks.

More than 350
University of
Minnesota programs
for prekindergarten
through 12th grade
serve students
throughout the state
and beyond. Over
650,000 students and
more than 1,000
Minnesota schools
are affected by these
programs.

Elementary Education Teacher Licensure—Students take liberal education courses in a freshman-admitting college and apply to the foundations of education major after completing 60 credits. After successfully completing a B.S. in foundations of education, students can move directly into the M.Ed. elementary education teacher licensure program. For more information, see the foundations major on page 122 and contact SPS, 110 Wulling Hall (612-625-6501).

Prekindergarten Through Grade 12 Teacher Licensure—As undergraduates, students pursue a major related to the area in which they want to teach and may apply for early admission to the master of education (M.Ed.) program after 60 credits. If accepted and program requirements are fulfilled, students receive preferred admission to a licensure program upon timely completion of their undergraduate degree and completion of education admission requirements.

Early Admission Option

Students with early-admission status must

- attend a one-credit course (EdHD 3001—Exploring the Teaching Profession) with other pre-education students each semester they are part of the early-admission option.
- complete at least 100 hours of work experience in an educational setting (at least two hours per week over six to nine months) as part of EdHD 3001.
- complete their undergraduate degree in two years.
- maintain a 3.00 minimum GPA, overall and in their major.
- begin the licensure program within two years of graduating from their undergraduate program.
- attend a preregistration meeting.

Students may apply for early-admission status during the spring semester of the academic year in which they complete 60 credits. The deadline is April 15.

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). 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 in the lobby a few hours each weekday to answer general questions regarding admission, program requirements, academic planning, registration, academic progress, scholarships, career services, teacher licensure, and commencement, among many 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).

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 3,800 members, the society conducts a variety of professional and social activities each year for CEHD graduates. Benefits include the CEHD alumni magazine, *The Link*; the UMAA magazine, *Minnesota*; Internet access; discounts on theatre and athletic tickets; and library access. For membership information, call 612-625-1310 or 800-UMALUMS.

*College of
Education and Human
Development*



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).

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.

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).

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.coled.umn.edu/>
625-6806

Student & Professional Services (SPS)

110 Wulling Hall, Minneapolis
<sps.coled.umn.edu/>
625-6501, fax: 626-1580
e-mail: spsinfo@tc.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
<ci.coled.umn.edu>
Fred Finley, chair
625-6372

Educational Policy and Administration

330 Wulling Hall, Minneapolis
<edpa.coled.umn.edu>
James Hearn, chair
624-1006

Educational Psychology

206 Burton Hall, Minneapolis
<edpsy.coled.umn.edu>
Mary McEvoy, acting chair
624-3543

Institute of Child Development

180 Child Development Building, Minneapolis
<icd.coled.umn.edu>
Ann Masten, director
624-0526

Kinesiology and Leisure Studies

110 Cooke Hall, Minneapolis
<www.kls.coled.umn.edu>
Michael Wade, director
625-5300

Bob Pickert, undergraduate contact
625-8868

Work, Community, and Family Education

210A Vocational and Technical Education Building, St. Paul
<wcf.coled.umn.edu/>
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.coled.umn.edu/alumni/>
625-1310

Through Web66,
the college helped
develop the nation's
first elementary
school Web site at
Hillside Elementary
School in Cottage
Grove, Minnesota.

College of Education and Human Development

Degree Programs

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.

Students may choose one of three specialization areas: agricultural science and technology education; agricultural leadership, training, and development; or natural and managed environmental education.

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. In addition, graduates of this specialization also are qualified for a broad array of agriculturally related positions in sales, management, finance, and production aspects of agriculture. The specialization allows students to have an emphasis area that includes a broad agricultural science and technology background.

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 (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 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)

Chem 1011—General Principles of Chemistry (4 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 1103—Crops, Environment, and Society (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)

Agro 3003—Introduction to Integrated Weed Management (1 cr)

Ent 3001—Insects and Insect Management (1 cr)

PIPa 3001—Plant Disease Biology and Management (1 cr)

Plus 3-4 credits from the following:

Agro 1101—Biology of Plant Food Systems (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)

FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)

Plus 3 credits from the following:

Agro/AnSc 3203—Environment, Global Food Production, and Citizens (3 cr)

EEB 3001—Ecology and Society (3 cr)

ES 1011—Issues in the Environment (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 (38-38.5 cr)

Foundations (15-15.5 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 (4 cr)

AFEE 5113—Adult Agricultural Education Program Development and Technology (3 cr)

AFEE 5114—Agricultural Education Teaching Seminar (1 cr)

Work, Community, and Family Education (8 cr)

WCFE 5697—Teaching Internships: School and Classroom Settings (2 cr)

WCFE 5698—Teaching Internship (6 cr)

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 124 credits, including required courses in the major. Students also must complete the University's liberal education (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 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 (8 cr)

Phil 1003—Introduction to Ethics (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)

Agro 3003—Introduction to Integrated Weed Management (1 cr)

Ent 3001—Insects and Insect Management (1 credit)

PIPa 3001—Plant Disease Biology and Management (1 cr)

Plus at least 6 credits from the following:

Agro 1101—Biology of Plant Food Systems (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 5105—Strategic Planning in Human Resource Development (3 cr)

HRD 5201—Personnel Training and Development (3 cr)

HRD 5301—Organization Development (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.

HRD 5001W—Survey: Human Resource Development and Adult Education (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 Systemics (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)

PIPa 2002—Diseases of Field Crops (3 cr)

PIPa 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)

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. They must maintain an overall GPA of 2.00 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 (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 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 (9-10 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 1103—Crops, Environment, and Society (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)

Psy 1001—Introduction to Psychology (4 cr)

or GC 1281—General Psychology (4 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)

Environmental Science (40 cr)

Environmental (8-9 cr)

ES 1011—Issues in Environment (3 cr)

FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)

Plus 2-3 credits from the following:

EEB 3001—Ecology and Society (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)

PIPa 3001—Plant Disease Biology and Management (1 cr)

Ent 3001—Insects and Insect Management (1 cr)

Agro 3003—Introduction to Integrated Weed Management (1 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)

College of
Education and Human
Development

Food Science (3 cr)

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

Professional Education (38–38.5 cr)

Foundations (15–15.5 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 (4 cr)

AFEE 5113—Adult Agricultural Education Program Development and Technology (3 cr)

AFEE 5114—Agricultural Education Teaching Seminar (1 cr)

Work, Community, and Family Education (8 cr)

WCFE 5697—Teaching Internship: School and Classroom Settings (2 cr)

WCFE 5698—Teaching Internship (6 cr)

Business and Industry Education

Department of Work, Community, and Family Education B.S.

The undergraduate business and industry education major, offered through the Department of Work, Community, and Family Education, includes two possible focuses: general industrial education (prelicensure in technology education) and vocational and technical education (technical college teaching). Students may take courses meeting requirements for a combination of these focuses. This would require taking additional industrial training courses. Graduate study also is available in both focuses. Courses followed by TES (Teacher Education Sequence) fulfill TES state licensure requirements.

A technical education certificate is also available. For more information, see the Certificates section on page 126.

General Industrial Education Focus (prelicensure)

Degree Requirements

Students completing the general industrial education (prelicensure in technology education) focus are awarded the B.S. degree, which fulfills prerequisites for entry into the master of education (M.Ed.)/initial licensure program for public school teaching in technology education. Completing the M.Ed./initial licensure program usually results in recommendation for licensure to teach technology education in grades 5-12 in Minnesota public schools. Students may graduate from this program with a minimum 2.00 GPA, but a minimum 2.80 GPA is required for admission to the M.Ed./initial licensure program.

Students also must complete the University's liberal education (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 in this catalog.

Admission Requirements—To be admitted to this program, students must complete 30 credits and have a minimum overall GPA of 2.00.

Required Courses

Industrial Education Pedagogical Studies (19-21 credits)

The BIE pedagogical studies course block includes courses in curriculum, teaching methods, testing, vocational guidance, and working with special needs students, as well as in the history and purposes of business and industry education.

BIE 1301—Introduction to Vocational-Technical Teaching (2 cr)

TES — Required for initial state vocational licensure (not required of students who have completed two other TES courses).

BIE 5325—Foundations of Industrial Education (3 cr)

BIE/HRD 5601—Student and Trainee Assessment (2 cr) TES

BIE/HRD 5628—Multimedia Presentations in Business (3 cr)

BIE/HRD 5629—Course Development for Business and Industry (2 cr) TES

BIE/HRD 5661—Instructional Methods for Business and Industry (2 cr) TES

WCFE 5801—Educating Special Populations in Work, Community, and Family Settings (3 cr)

and BIE 5321—Vocational Guidance in Business and Industry (2 cr)

or BIE 5344—Facilities Management in Business and Industry (3 cr)

Core Courses (44 cr)

Issues, Structures, and Functions of Industry (8 cr)

Courses dealing with issues, structures, and functions of industry; selection must be approved by student's adviser.

Technology Content (36 cr)

Basic Technology Content (24 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, Energy and Power, Transportation and Machinery Technologies (3 cr)

BIE 3122—Communication and Information Technology (3 cr)

BIE 3123—Energy, Power, and Transportation Technology (3 cr)

BIE 5101—Technological Problem Solving (3 cr)

Advanced Technology Content (12 cr)

BIE 3151—Technical Development: Advanced (1-4 cr)

BIE 5151—Technical Development: Specialized (1-12 cr)

Additional Requirements (9-14 cr)

BIE 1396—Supervised Vocational-Technical Teaching (2 cr)

BIE 5011—Introduction to Microcomputer Applications (3 cr)

EPsy 5135—Human Relations Workshop (4 cr)

or EdHD 5003—Developmental and Individual Differences in Educational Contexts (3 cr)

and EdHD 5009—Human Relations: Applied Skills for School and Society (1 cr)

PubH 3004—Basic Concepts in 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/1.5 cr)

WCFE 5301—Philosophy and Practice of Vocational Education (2 cr)

TES — Required for initial state vocational licensure; required for industrial education.

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 some students; adviser approval is required.

Vocational and Technical Education Focus

The vocational and technical education focus is a professional development degree program for current and prospective technical college instructors and teachers in selected secondary vocational programs. Students completing this focus are awarded the B.S. degree and complete the teacher education sequence and other requirements for Minnesota state vocational teaching licensure. Students should consult state licensing personnel regarding specific vocational requirements for the field in which they wish to teach.

Students also must complete the University's liberal education (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 in this catalog.

Admission Requirements—To be admitted to this program, students must complete 30 credits or be awarded 30 credits for verified and approved technical work experience. Students must also have earned a minimum overall GPA of 2.50.

Required Courses

Business and Industry Education Pedagogical Studies (19-21 cr)

The BIE pedagogical studies course block includes courses in curriculum, teaching methods, testing, vocational guidance, and working with special needs students, as well as in the history and purposes of business and industry education.

- BIE 1301—Introduction to Vocational and Technical Teaching (2 cr)
TES — Required for initial state vocational licensure (not required of students who have completed two other TES courses).
- BIE 5325—Foundations of Industrial Education (3 cr)
or BIE 5401—Introduction to Business and Marketing Education (3 cr)
- BIE/HRD 5601—Student and Trainee Assessment (2 cr) TES
- BIE/HRD 5629—Course Development for Business and Industry (2 cr) TES
- BIE/HRD 5661—Instructional Methods for Business and Industry (2 cr) TES
- or BIE 5463—Methods of Teaching Keyboarding and Word Processing (2 cr)
- or BIE 5452—Methods of Teaching Business Concepts (3 cr)
- or BIE 5457—Methods of Teaching for Business Employment (3 cr)
- 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 (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 Concepts (3 cr)
- BIE 5457—Methods of Teaching for Business Employment (3 cr)

Core Courses (44 cr)

Issues, Structures, and Functions of Business and Industry (8 cr)

Courses dealing with issues, structures, and functions of business and industry; 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 or industry or vocational-technical specialization courses (30 cr)

30 credits, at least 10 of which must be earned through BIE 5596 or verified work experiences.

- BIE 3151—Technical Development: Advanced (1-4 cr)
- BIE 5151—Technical Development: Specialized (1-12 cr)

- BIE 5596—Occupational Experience in Business and Industry (1-10 cr)
or verified work experience in business or industry (30 cr max)

Technical/Occupational Development in Business or Industry (6 cr)

- BIE 3151—Technical Development: Advanced (1-4 cr)
- BIE 5012—Advanced Word Processing (3 cr)
- BIE 5013—Spreadsheet Analysis Using Microcomputers (3 cr)
- BIE 5014—Database Microcomputer Applications (3 cr)
- BIE 5015—Integrated Microcomputer 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)
- BIE/HRD 5628—Multimedia Presentations in Business (3 cr)

Additional Requirements (12-17 cr)

- AdEd 5101—Strategies for Teaching Adults (3 cr)
- BIE 1396—Supervised Vocational-Technical Teaching (2 cr) (required only of those students without teaching experience)
- BIE 5011—Introduction to Microcomputer Applications (3 cr)
- EPsy 5135—Human Relations Workshop (4 cr)
or EdHD 5003—Developmental and Individual Differences in Educational Contexts (3 cr)
and 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/1.5 cr)
- WCFE 5301—Philosophy and Practice of Vocational Education (2 cr)
TES — Required for initial state vocational licensure; required for industrial education (recommended for business education).

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 some students with adviser approval.

Coaching

School of Kinesiology and Leisure Studies

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 126.

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)
- 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, Kin 3126/5126, Kin 3385, Kin 4385, Kin 5136, SpSt 3621, SpSt 3641

Two courses from Kin 3168, Kin 3169, Kin 3171, Kin 3172, Kin 3173, Kin 3174, Kin 3175, Kin 3176, Kin 3177, Kin 3178, Kin 3179, Kin 3181, Kin 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

Department of Curriculum and Instruction

B.S.

CEHD admits upper division (typically junior status) students to this undergraduate program that serves as preparation for the M.Ed./initial licensure program in elementary education. The curriculum includes an extensive core of liberal education courses central to elementary school teaching. The major coursework provides a foundation for working with children in a school setting and emphasizes the multicultural nature and special needs of an urban environment.

Students who complete this program receive a B.S. degree with a major in foundations of education. Students may move into the initial licensure program in elementary education if they meet the minimum entrance criteria for the M.Ed. degree (contact SPS at 612-625-6501). Licensure requirements can be completed with a designated cohort with additional coursework and clinical experience. This program also prepares graduates to move into settings in which a strong liberal education is useful.

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 1–6, and experience with diverse populations.

Degree Requirements

Students may graduate from this program with a minimum 2.00 GPA, but a minimum 2.80 GPA is required for admission to the M.Ed./initial licensure program. Students must complete at least 120 credits, including 24.5 credits in the major.

Students also must complete the University's liberal education (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 in this catalog.

Required Courses

Prerequisites

CI 1001—Introduction to the Elementary School (3 cr)
 Psy 1001—Introduction to Psychology (4 cr)
 or GC 1281—General Psychology (4 cr)

Introductory Block

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

CI 5183—Applying Instructional Methods in the Elementary Classroom (1 cr)
 EPsy 5613—Foundations of Special Education I (3 cr)

Courses for Junior and Senior Year

CPsy 4303—Adolescent Psychology (4 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 5003—Fundamentals of Alcohol and Drug Abuse (1.5 cr)
 or PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)

Human Resource Development

Department of Work, Community, and Family Education
B.S.

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 126.

Admission Requirements—Admission to this program is competitive; all applicants with a minimum 2.50 overall GPA are considered. Admission decisions are made once each semester and once during the summer, based on availability of positions within the program. For more information about admission, contact the undergraduate HRD adviser.

Degree Requirements

Students must complete at least 120 credits, including at least 40 credits in the major. Students also must complete the University's liberal education (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 in this catalog.

All human resource development students must complete the following: 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 the University's liberal education requirements, including some specified courses within those requirements (contact SPS). An overall GPA of 2.00 is required for graduation.

Required Courses

General Courses

Psy 1001—Introduction to Psychology (4 cr)
 One speech performance course
 One microeconomics or macroeconomics course
 One college-level math course (not statistics)

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 5001—Survey: Human Resource Development and Adult Education (3 cr)
 HRD 5196—Internship: Human Resource Development (4 cr)
 (Students may take up to an additional 6 credits if those credits are not used to meet the minimum of 21 credits required by HRD)
 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 remaining HRD courses and may include:
 FE 5201—Family and Work Relationships (3 cr)
 WCFE 5121—Principles of Supervisory Management (3 cr)

Required Related Coursework

BIE 5011—Introduction to Microcomputer Applications (3 cr)
 or an advanced computer course in BIE if the adviser agrees that the student already has the competencies included in BIE 5011
 WCFE 3011W—Introduction to Technology and Public Ethics (3 cr)
 or WCFE 5011W—Technology and Public Ethics (3 cr)
 Supporting program (13 credits minimum)
 Program electives to complete the 120 credit requirement for the B.S.

Electives—A significant number of elective credits is usually available. These may be selected in consultation with the student's adviser.

Final Project

Students must complete 4 credits of internship.

Kinesiology

School of Kinesiology and Leisure Studies
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 allied health sciences, such as athletic training, 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 settings.

Emphasis areas in the kinesiology major include athletic training, 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.

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) or college algebra or calculus. Students must have an appropriate high-school math background or acceptable college-level course. Students who have satisfied the math prerequisite for physics should

enroll in a statistics course (a junior/senior-level statistics class is required by the pre-physical therapy emphasis area.)

- Psy 1001—Introduction to Psychology (4 cr) or GC 1281—General Psychology (4 cr) (grade of C- or higher recommended)
- Kin 3027—Human Anatomy for Kinesiology Students (3 cr) or CBN 3001—Human Anatomy (3-4 cr) or equivalent
- 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

Degree Requirements

Students may graduate from this program with a minimum 2.00 GPA, but a minimum 2.80 GPA is required for M.Ed./initial licensure program.

Students completing this program with a total of 120 credits, including 54 credits in the major, and a 2.00 GPA both overall and in major courses receive the B.S. degree in kinesiology. Eligible Kin-designated courses are listed in the *Class Schedule* and numbered 18xx and above.

Students also must complete the University's liberal education (LE) requirements, including approved writing intensive (W) courses. For more information, see page 35 in this catalog.

Required Courses

- Kin 1871—Introduction to Kinesiology (2 cr) (recommended prerequisite)
 Kin 3027—Human Anatomy for Kinesiology Students (3 cr)
 or Kin 3111—Human Anatomy (2 cr) or equivalent
 or InMd 3001—Human Anatomy (3 cr)



*College of
 Education and Human
 Development*

Kin 3112—Introduction to Biomechanics (3 cr)
 Kin 3126—Psychology and Sociology of Sport (3 cr)
 Kin 3131—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)
 Kin 4385—Exercise Physiology (4 cr)
 Phsl 3051—Human 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

Final Project

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)

Recreation, Park, and Leisure Studies

School of Kinesiology and Leisure Studies

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, and therapeutic recreation. Many students couple recreation, park, and leisure studies with coursework in other disciplines, such as management, social work, physical and occupational therapy, forestry, 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 recreation, outdoor recreation/education, or public parks and recreation
- therapeutic recreation emphasis areas that include 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 126.

Admission Requirements—To be admitted to this program, students must complete a minimum of 30 credits of the University’s liberal education requirements, including the writing skills 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 35 in this catalog. Appropriate related and major courses may be applied toward these requirements.

Degree Requirements

Students completing this curriculum with a total of 120 credits, including 78 credits in the major, and a minimum 2.00 GPA in Rec-designated courses receive the B.S. degree in recreation, park, and leisure studies. A minor is not required of majors in this program. Certain emphasis areas require specific courses to meet curriculum requirements; consult the School of Kinesiology and Leisure Studies (612-625-5300). A preliminary program of coursework should be filed during the second term after admission.

Required Courses

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

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)

Spch 1101—Introduction to Public Speaking (3 cr)

or GC 1461—Oral Communication in the Public Sphere (3 cr)
 or Rhet 1223—Oral Presentations in Professional Settings (3 cr)
 or Spch 1313—Analysis of Argument (3 cr)

Rec 1501—Orientation to Leisure and Recreation (3 cr)

Rec 3281—Research and Evaluation in Recreation, Park, and Leisure Studies (4 cr)

Rec 3541—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)

9 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.

University women's
 intercollegiate
 athletics offers
 basketball, cross
 country, golf,
 gymnastics, hockey,
 rowing, soccer,
 softball, swimming
 & diving, tennis,
 track & field, and
 volleyball.
 The men's program
 offers baseball,
 basketball, cross
 country, football,
 golf, gymnastics,
 hockey, swimming &
 diving, tennis, track
 & field, and
 wrestling.

Sport Studies

School of Kinesiology and Leisure Studies

B.S.

The sport studies major focuses on contemporary sport as a product of social, psychological, and economic phenomena. Because of its predominant role in our culture, economy, and societal behavior, sport is a fertile 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 and kinesiology.

Coursework in sport studies addresses such topics as ethics and sport, psychology of sport performance, sport as a sociocultural phenomenon, sport history and philosophy, sport facilities and equipment, sport promotion, sport law, and the business of sport.

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 126.

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 April 1 admission deadline. For more information about liberal education requirements, see page 35 in this catalog.

Degree Requirements

The sport studies program totals 120 credits, including 48 credits of liberal education requirements, 25 credits of required major courses, 16 credits of college and curriculum requirements, 20 credits of focused electives, and elective courses to satisfy the 120-credit graduation requirement.

A GPA of 2.00 in courses with a SpSt designator is required to graduate.

Required Courses

Major Courses (25 cr)

- SpSt 1701—Introduction to Sport Studies (2 cr)
- 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 3881—Senior Seminar in Sport Studies (3 cr)
- SpSt 3996—Practicum: The Sport Experience (10 cr)

College and Curriculum Requirements (16 cr min)

Education and human development electives (not including Kin, Rec, or SpSt courses) (6 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)

Physical education activity courses (3 courses, 1 cr each)

- Spch 1101—Introduction to Public Speaking (3 cr)
- or GC 1461—Oral Communication in the Public Sphere (3 cr)
- or Rhet 1223—Oral Presentations in Professional Settings (3 cr)
- or Spch 1313—Analysis of Argument (3 cr)

Psy 1001—Introduction to Psychology (4 cr)

or GC 1281—General Psychology (4 cr)

Soc 1001—Introduction to Sociology (3 cr)

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 as listed below:

Coaching

- FSeN 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 must choose at least 5 credits from courses in the following list to earn coaching certification or a coaching minor:

- Kin 3027—Human Anatomy for Kinesiology Students (3 cr)
- or Kin 3111—Human Anatomy (2 cr)
- or equivalent course
- 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 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 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)
- Econ 1101—Principles of Microeconomics (4 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)
- HRIR 3021—Human Resource Management and Industrial Relations (2 cr)

Mktg 3001—Principles of Marketing (2 cr)

Mgmt 3001—Fundamentals of Management (2 cr)

Spch 3201—Introduction to Electronic Media Production (3 cr)

Spch 3441—Introduction to Organizational Communication (3 cr)

SpSt 3111—Sports Facilities (2 cr)

SpSt 3112—Applied Sport Science (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 5375—Competitive Sport for Children and Youth (3 cr)

Rec 1501—Orientation to Leisure and Recreation (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.

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 program 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 Development.

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).

Program Completion 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/PA 3961W—Leadership,
You, and Your Community (3 cr)
EdPA 4303W—Leadership in the World/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 Verna Cornelia Simmons in the Office for Student Development, 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 and Leisure Studies 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, call the Department of Educational Policy and Administration at 612-624-1006.

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 (612-624-3004) 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 and Leisure Studies.

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.

General College

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GENERAL COLLEGE
YOUR GATEWAY TO OPPORTUNITY
IN THE 21ST CENTURY

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General College

General Information

Since 1992, the mission of the 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 top-notch human and technological resources to its students. Students admitted to GC are expected to transfer within two years.

General College 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 or 1-800-752-1000.

New Student Orientation

After students are admitted to the University, they receive information from General College 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 their orientation date. All new students who enroll in GC must attend a two-day orientation session during which they register for classes. Most orientation sessions are held in June and early July.

During 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 GC curriculum, liberal education requirements for the University, registration procedures and deadlines, information on academic progress, and guidelines for academic planning. The workbook also gives students useful information about the college and the University, current policies and procedures, worksheets to help plan for and prepare to register for classes, and tips on how to be successful students.

On the second day of orientation, students have a 45 minute individual appointment with an adviser to review their registration materials, interpret placement test results, and plan their first semester's schedule. Students then self-register for classes via computers.

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 (via the Internet). GC offers math courses for those who do not have the skills and concepts necessary for college-level math. 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 ginfo@tc.umn.edu.

Curriculum

General College classes are small, with an excellent student-to-instructor ratio that allows students to receive more personalized attention. Most sections of GC's freshman writing seminars are limited to 18 students and taught in microcomputer classrooms. Class size for humanities, mathematics, and social science courses ranges 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. Twenty-nine GC faculty have received the award since its inception in 1967.

Most General College courses meet the University's liberal education and writing intensive requirements and are transferable. GC 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.

General College also offers pre-college level, noncredit mathematics courses for any University student who needs them. Placement tests are used to determine the correct mathematics starting point. 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 semesters. During the first year, students take all GC courses. 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 1997, the second-year retention rate was 77.3 percent, comparing very favorably with other freshman-admitting colleges. Students starting in GC and transferring to CLA graduate as quickly as students who initially start in CLA.

Several GC courses are also offered in the evenings through the College of Continuing Education, and some of these classes meet in the community (off campus). Complete information about these courses is available in the current *College of Continuing Education Catalog*.

The Student Information Center provides General College students with information on admission, course registration, policies and procedures, and referrals to other services.

The General College Student Workbook has received national awards recognizing it as a valuable resource guide given to students as they start their college career.

Base 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, General College provides a supportive learning environment for students in a program called the Base Curriculum. The Base Curriculum is a selection of core lower division courses that meet University graduation requirements and introduce students to core disciplines of college study in a supportive environment. In addition to innovative instructional methods, the Base 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 the Base Curriculum—which includes courses in writing, mathematics, natural sciences, social sciences, and humanities—during their first year.

Policies

Registration Procedures—General College students must file a pre-registration agreement with their 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 that current courses are not equivalent to courses already completed.

- GC Registration Policies**—Students are expected to
- complete the following Base Curriculum (BC) courses while enrolled in GC:
 - mathematics (complete any preparation requirements not completed in high school)
 - science (one BC course)
 - social sciences (one BC course)
 - humanities (one BC course)
 - freshman composition (completion of GC 1421 and GC 1422 or equivalent).
 - complete a BC course in an area of study (science, social sciences, or humanities) before taking a course designated as Transition Curriculum or 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.)

For additional information concerning registration procedures, see the *General College Student Workbook*.

Holds—Registration holds are electronic codes that restrict a student's registration until the unit or office that placed the hold either removes or temporarily releases it. Holds may be placed by colleges or by offices 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 holds 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.
- 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 change 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 fee charged. See the *Class Schedule*.

Grades—Noncredit course grades are posted for the semester of their registration on the transcript. They are also considered in the college's academic progress review, even though they do not appear on the transcript cumulative GPA.

Monitoring Academic Performance—GC instructors use *Academic Alert* forms throughout the 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 both students and their advisers of the results.

Academic Standing—All University of Minnesota students are expected to maintain a minimum 2.00 GPA. 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.

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 3.67 (A-) or higher; and
- completion of a minimum of 12 credits during the semester

Dean's Scholars List Criteria:

- semester GPA of 3.67 (A-) or higher; and
- completion of a minimum of 12 credits during the semester (including noncredit 0xxx courses)

GC's Scholars List Criteria:

- semester GPA of 3.00 (B) or higher; and
- completion of a minimum of 12 credits during the semester (including noncredit 0xxx courses)

Academic Probation—GC's system of academic probation gives help on an individual basis 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 GC. 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 year-long course plan and transfer plan. All GC students must participate in the Transfer Check-In Program sponsored by the General College Transfer and Career Center. The 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 associate 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 in 127 Appleby Hall 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 Office of the Registrar 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 GC 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 also refer students to an "on call" adviser to answer quick questions.

First year students must have adviser approval for registration, which they receive by attending a preregistration group meeting or 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. (Transfer usually occurs at the end of the second year of enrollment.)

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 a contract form that has been worked out in consultation with a faculty mentor to the director of academic affairs. 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.

Commanding English—Commanding English (CE) is a year-long program for GC freshmen for whom English is a second language. ESL support is built into a sequence of credit-bearing GC classes (academic reading, basic writing, speech, immigration literature, 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).

Academic Resource Center (ARC)—The ARC, 11 Appleby Hall, is a clearinghouse for GC tutorial services in several subject areas and computer access for GC students.

- The Computer Center provides access to PCs with Windows and Macintosh platforms.
- The Math Center provides walk-in assistance to students for math and for courses that use math.
- The Writing Center helps students with writing at any stage of completion. Help can be provided by electronic consultation at writers@tc.umn.edu or by one-to-one consultation in the center.

Appointments are not necessary for the Computer, Math or Writing Centers.

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).

Find it



The GC Transfer and Career Center in 127 Appleby Hall has many resources to help students make decisions about their majors and explore career choices. Find information on the Web at www.gen.umn.edu/transfer_career_ctr.

Twenty-nine General College faculty have received the Horace T. Morse-Alumni Association Award for Outstanding Contributions to Undergraduate Education. Four GC advisers have received the John Tate Award for Excellence in Undergraduate Advising.

Ronald E. McNair Program—This 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, first-generation high school students. Reading, writing, and mathematics skills are emphasized in the academic segment of the program; theatre, art, athletic, and experiential educational activities constitute the creative and recreational component. 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).

Student Parent HELP Center—The programs and services of the Student Parent HELP Center are designed to promote access, retention, and academic success for students who are parents at the University. Located in General College, the Student Parent HELP Center open to undergraduate students in any college of 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, a newsletter, and other services including a lounge and study room.

University Day Community—University Day Community is an adolescent treatment center for educationally, emotionally, and behaviorally dysfunctional youth. University Day Community operates five separate programs: U-Day, City Quest, Pro-Teen, Echo Eliot, and Henry Day Treatment. Services include family, personal, and group counseling; art and experiential therapy; and individualized academic programming. The programs also provide internships, field experiences, and work-study employment opportunities. The University Day Community Center is located at 101 27th Avenue S.E., Suite 101, Minneapolis, MN 55414 (612-627-4107).

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. This office also schedules individual appointments with the college’s advising staff. Students are encouraged to check the bulletin boards in this area for regularly updated announcements and information about the college and University.

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 monthly forums. For more information, call 612-626-8706 or visit the Web site at <www.gen.umn.edu/research/crdeul/>.

A Commitment to Excellence (ACE)—ACE is a joint effort by GC, Minneapolis School District No.1, Minneapolis Park and Recreation Board, and Hennepin County Children and Family Services to improve the academic progress of African American males between the ages of 12 and 15 in the Minneapolis Public Schools who are considered at-risk. For more information, call 612-626-8704.

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, greater 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).

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 on a walk-in basis.

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

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.

Directory

(area code 612)

General College Administration

Office of the Dean

109 Appleby Hall
625-6885
626-7848 (fax)
David V. Taylor, dean
Marjorie K. Cowmeadow, associate dean and director of student services

Academic Affairs and Curriculum

240 Appleby Hall
625-2880
Terence Collins, director

Development and Alumni Relations

121 Appleby Hall
625-8398
Kirsten Jordan, director
<www.gen.umn.edu/alumni>

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
<www.gen.umn.edu/research/ore>

Grants Office

148 Appleby Hall
626-9036

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>

College Registrar

33 Appleby Hall
626-7141

Academic Resource Center (ARC)

11 Appleby Hall
626-1328
<www.gen.umn.edu/resources/arc>

Math Center

11 Appleby Hall
<www.gen.umn.edu/resources/arc/mathcenter.htm>

For more information on becoming a Student Board member, stop by the Student Information Center, 25 Appleby Hall (612-625-6004).

TRIO students may serve on the TRIO Student Advisory Board. Contact the TRIO office, 40 Appleby Hall (612-625-0772).

The Student Parent HELP Center holds a weekly discussion and support group for student parents in addition to an annual winter party for the children of HELP Center students. For more information contact 80 Appleby (612-625-5307).

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

Student Parent HELP Center

180 Appleby Hall
625-5307
626-9867 (fax)
<www.gen.umn.edu/programs/help_center>

Commanding English Program

233 Appleby Hall
625-3514

TRIO/Student Support Services

40 Appleby
625-0772
625-0704 (fax)

McNair Program

40 Appleby
625-0772
625-0704 (fax)

Upward Bound

2 Appleby Hall
626-1665
625-0704 (fax)

University Day Community

101 27th Avenue S.E. #101
627-4107
627-4195 (fax)

ACE (A Commitment to Excellence)

151 Appleby Hall
626-8704

CRDEUL (Center for Research on Developmental Education and Urban Literacy)

333 Appleby Hall
626-8706

CTAD (Curriculum Transformation and Disability)

251 Appleby Hall
626-7292
626-1014 (TTY/TDD)

GC on the Web

<www.gen.umn.edu>

Find it



The Academic Resource Center (ARC) Web site has links to writing and math resources at <www.gen.umn.edu/resources/arc>.

General College

Find it



The Student Information Center located in 25 Appleby Hall is your one-stop-shop for information. Check the Web site at <www.gen.umn.edu/student_info_ctr>.

College of Human Ecology

This is the College of Human Ecology
section of the 2000-2002 University of
Minnesota Undergraduate Catalog.

CHE

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College of Human Ecology

General Information

The College of Human Ecology (CHE), celebrating 100 years of excellence, 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 the strengths of four units; Design, Housing, and Apparel; Family Social Science; Food Science and Nutrition; and School of Social Work.

The undergraduate programs are professionally-focused and guided by faculty who make working with undergraduate students a top priority. The faculty have close working relationships with industry professionals from the community who collaborate on research 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.

The Goldstein Museum, a nationally recognized design museum, was founded in 1976 to support the curriculum of the Department of Design, Housing, and Apparel. The museum collects and exhibits the art closest to people's daily lives: clothing, textiles, and decorative and graphic arts, with an emphasis on objects of the late-nineteenth and twentieth centuries. Students are involved in all aspects of museum operations, from collections care to exhibition development and installation.

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.

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. Have an overall GPA of at least 2.50.

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.

University of Minnesota Transfer Students—Students must be in good academic standing. Contact the CHE college office for more information.

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 five 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

Department of Food Science and Nutrition

Food Science
Nutrition

School of Social Work

Postbaccalaureate degrees only
Department of Work, Community, and Family Education
Postbaccalaureate degrees 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 two minors: food science and nutrition. Both are explained in the following Degree Programs section. See also the intercollegiate design minor in the same section.

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 the Bailey Residential Hall on the St. Paul campus. Lower division honors students complete three honors options and receive a certificate of completion at the annual CHE honors and awards programs.

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.

The upper division honors program offers juniors and seniors additional opportunities to achieve their academic and professional goals. Upper division students complete two honors options 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>.

Policies

CHE Academic Progress—CHE students 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 GPA in order to go through portfolio review and move from pre-major to major status. If a student's GPA falls below 2.50, the student is notified and required to meet with an academic adviser each term before registering.

Credit Load—To carry more than 20 credits, students must have a B (3.00) average overall and must obtain permission from the Student Scholastic Standing Committee, 32 McNeal Hall.

Petitioning—To request permission to depart from requirements and procedures, students must complete a petition form available at the college office, 32 McNeal Hall. Students should meet with their adviser to discuss the petition and to obtain his or her signature. The petition and a transcript are then submitted to the college office for a decision. The decision is mailed to the student.

Student Scholastic Standing Committee—The Student Scholastic Standing Committee interprets and enforces faculty policy concerning academic regulations and requirements. The committee is also authorized to consider alternative ways of meeting those requirements when permission to depart from normal procedures is requested. For more information, students should call 612-624-4244.

CHE Appeals Procedures—When students have problems or questions, advisers, the program chairpersons, the department heads, and the Student Services staff in the college office are good sources of information and support.

Students who question some aspect of their college program may take their concern to an adviser, department program committee, or department head. The college office (612-624-9764) provides information about appeals procedures.

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 (612-625-3726) 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, 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 (612-624-1717).

Career Information

The Career Services Center, 68 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. Full- and part-time positions are posted in departments, on the CHE JOBLINE, and in the Career Services 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.

College of
Human Ecology

Find it



CHE Career Services

can be found on the

Web at

<www.che.umn.edu>.

While you're there, be

sure to register for

information about

job openings on the

CHE JOBLINE.

For questions concerning career planning, internships, and job opportunities, call the Career Services Center (612-624-6762).

Student Organizations

The Goldstein Museum is the only design-oriented museum in the Big Ten and features a collection of more than 12,000 costumes, textiles, and decorative art objects.

Human Ecology Student Ambassadors

- Promote the college to prospective students.
- Provide assistance to current students.
- Participate in college leadership and activities.
- Build community through energetic and fun programs.

The 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 Society of Interior Designers
- Clothing Design Club
- 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
- International Interior Design Association
- Minnesota Collegiate Retail Association
- Student Organization of Nutrition and Dietetics

Honor Societies

- Phi Upsilon Omicron

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

Work, Community, and Family Education

325 Vocational and Technical Education Building
624-3010



College of Human Ecology

Degree Programs

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 provide coverage of 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 1101, 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 84 credits in the major. Students must complete the University's liberal education requirements. Students must maintain an overall GPA of at least 2.00, including a grade of C- or better in all professional courses in the major.

Required Courses

Required courses must be taken A-F with a minimum grade of C-.

- DHA 1101W—Introduction to Design Thinking (4 cr)
- DHA 1201—Clothing Design, Merchandising, and the Consumer (3 cr)
- DHA 1311—Foundations I: Drawing and Design in Two and Three Dimensions (4 cr)
- DHA 1312—Foundations II: Color and Design in Two and Three Dimensions (4 cr)
- DHA 2213—Textile Analysis (4 cr)
- DHA 2214—Softlines Analysis (3 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 4212—Dress, Society, and Culture (4 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 3562—Technical and Professional Writing (4 cr)

Final Project

An internship is to be completed the last year of the student's program.

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. The major prepares its graduates for careers in working with individuals, families, or systems in human services. Students work with a faculty adviser to design a family-oriented area of study that focuses on a special population, issue, or complementary discipline. The major is enhanced by a required internship in the community related to students' 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 74 credits in the major. Students must also complete the University's liberal education requirements. All required courses must be taken A-F and completed with a grade of at least C-. Students must maintain an overall GPA of at least 2.00.

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 3562—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 3103—Family Resource Management (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 4104—Family Psychology (3 cr)
 FSoS 4105—Methods in Family Research (3 cr)
 FSoS 4296—Field Study: Working with Families (4 cr)
 or FSoS 4294—Research Internship (4 cr required)
 Select two additional courses from the following: 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 design a family-oriented application area in consultation with their adviser. The area may focus on a population such as children, adolescents, women, gays, lesbians, or refugees; an issue such as family economics, gerontology, alcohol and substance abuse, health, sexuality, human rights, the military, 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 research-oriented skills and research experiences for their application area.

Food Science

B.S.

Food scientists apply the principles of disciplines such as chemistry, physics, and microbiology to food processing, preservation, and product development. The food science program provides students with a basic foundation in calculus, chemistry, physics, communications, statistics, and biology. Professional courses center around food engineering/processing, food chemistry, food microbiology, and food quality.

Degree Requirements

Students must complete at least 120 credits, including 92 credits in the major. Students must also complete 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)
 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)
 Stat 3011—Introduction to Statistical Analysis (4 cr)
 Select one of the following lab courses: BioC 4025, Chem 2111, Chem 2311, FScN 4613
 Select one of the following microbiology courses: MicB 2032, MicB 3301, VPB 2032
 Select one of the following physics series: Phys 1101/1102, Phys 1201/1202, Phys 1301/1302

Note: Phys 1301 and 1302 are recommended.

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—Lab 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 (3 cr)
 One of the following courses with a Capstone component: FScN 4341, FScN 4342, FScN 4343, FScN 4344, FScN 4345, FScN 4346

Minor Requirements

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

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 students 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, DHA 1311, DHA 1312, and DHA 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 94 credits in the major. Students must also complete the University's liberal education requirements. All required courses must be taken A-F and all required DHA courses must be completed with a grade of at least a C-. Students must maintain an overall GPA of at least 2.00.

Required Courses

One course from each of the following areas: art history; history; photography; and business or economics or marketing
 DHA 1101W—Introduction to Design Thinking (4 cr)
 DHA 1311—Foundations I: Drawing and Design in Two and Three Dimensions (4 cr)
 DHA 1312—Foundations II: Color Design in Two and Three Dimensions (4 cr)
 DHA 1315—Foundations III: 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)

Travel to Europe to study design through the Design in Europe study abroad program. Contact the Design, Housing, and Apparel office for details.

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 3562—Technical and Professional Writing (4 cr)

Select one materials course from the following:
 DHA 4351—Design Process: Photography (3 cr) (if not taken for the photography requirement)
 DHA 4352—Design Process: Bookmaking (3 cr)
 DHA 4330—Surface Fabric Design Workshop (4 cr)
 DHA 4340—Woven, Knit, and Non-Woven Fiber Design Workshop (4 cr)

For additional approved courses, see your adviser.

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—Modeling and Animation (3 cr)
 DHA 5385—Internet-Based Media (3 cr)

For additional courses, see your adviser.

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.

Degree Requirements

Students must complete at least 120 credits, including 75 credits in the major. Students must also complete the University's liberal education requirements. All required courses must be taken A-F and completed with a grade of at least C-. Students must maintain an overall GPA of at least 2.00.

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 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 3562—Technical and Professional Writing (4 cr)
 WPS 4333—Understanding Residential Construction: The House as a System (2 cr)
 One finance course from ApEc 1101/Econ 1101, ApEc 1102/Econ 1102, Econ 3701, Econ 3801, Econ 4623
 One family course from FSoS 3101, FSoS 3102, FSoS 3103
 One planning course from Geog 3361W, Geog 3371W, Geog 3605W, Geog 5372W, PA 4200, PA 5211
 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, Econ 4623, 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 5211, 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, Econ 4623, 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, Afro-American 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 studies, Afro-American studies, Chicano studies, East Asian studies, Latin American studies, Russian and East European studies, Scandinavian studies, South and Southwest Asian studies, West European studies, women's 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.

Interior Design

Department of Design, Housing, and Apparel

B.S.

Interior designers solve problems about how people use their spaces. Designers perform tasks such as space planning, color specification, and building system integration for homes, hospitals, offices, hotels, and other spaces. The interior design program enables students to acquire:

- an understanding of the relationship between the individual and the environment,
- a sense of the designer's responsibility to society,
- a foundation in basic design,
- an understanding of functional and aesthetic needs,
- an understanding of historical styles and contemporary theories,
- technical knowledge and communication skills, and
- awareness of business and professional ethics.

The program is accredited by the Foundation for Interior Design Education Research (FIDER).

Upon graduation, students may work in residential or nonresidential design. Potential employers include interior design firms, architectural firms, health care institutions, and corporations.

Admission Requirements—Freshmen and transfer students are initially admitted into the program as pre-interior design majors.

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 102 credits in the major. Students must also complete the University's liberal education requirements. All required courses must be taken A-F and completed with a grade of at least C-. Students must maintain an overall GPA of at least 2.00. Finally, students must complete a 400 hour internship the summer after the third year.

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 I: Drawing and Design in Two and Three Dimensions (4 cr)
 DHA 1312—Foundations II: 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—Environmental Systems 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 (1cr, 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 (2 cr)
 Mktg 3001—Principles of Marketing (2 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 3562—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)

Nutrition

B.S.

The nutrition major explores how nutrients and the foods from which they are derived aid the body in health, growth, and development. With the major national and international concern for how food and nutrition affect health and disease, there are many career opportunities for registered dietitians and nutritionists. Students choose one of three options; nutrition, the coordinated program in dietetics, or nutrition science.

The interior design program is the only four-year accredited interior design program in Minnesota.

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 required credits in the major. Students must also complete 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 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 3562—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 (2 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 (2 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 (2 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 (2 cr)
 Math 1031—College Algebra and Probability (3 cr)
 Mgmt 3001—Fundamentals of Management (2 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 (3 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 (3 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)

Find it



The College of Human Ecology can be found on the Web at <www.che.umn.edu>.

College of Human Ecology

Minor Requirements

For those having completed Biol 1009; Chem 1021, 1022, and 2301; and BioC 3021:

- FScN 1112—Principles of Nutrition (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)

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, visual merchandising, buying, advertising, sales promotion, and human resources.

Degree Requirements

Students must complete at least 120 credits, including 94 credits in the major. All required courses must be taken A-F and completed with a grade of at least C-. Students must maintain an overall GPA of at least 2.00 and must also complete the University's liberal education requirements.

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 3217—Fashion Trends and Visual Analysis (3cr)

- DHA 3245—Nonstore Retailing (3 cr)
- DHA 4196—Internship in DHA (3 cr)
- DHA 4212W—Dress, Society, and Culture (4 cr)
- DHA 4217—International Developments in Textiles and Apparel (4 cr)
- DHA 4241—Retail Promotion (3 cr)
- DHA 4242—Retail Buying (3 cr)
- DHA 5216—Textile and Apparel Consumer (3 cr)
- HRIR 3021—Human Resource Management and Industrial Relations (2 cr)
- Math 1031—College Algebra and Probability (3 cr)
- Mgmt 3001—Fundamentals of Management (2 cr)
- Mgmt 4002—Managerial Psychology (4 cr)
- Mktg 3001—Principles of Marketing (2 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 3562—Technical and Professional Writing (4 cr)

Final Project

An internship is to be completed before the last semester of the student's program.

Design Minor

U of M Design Institute

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 Coordinator. 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 coordinator at 612-625-3373.

The minor requires completion of at least 14 credits, including:

Required Courses

- DHA/LA 1101— 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 Design Minor Office, 100 Nicholson Hall, or on the Web at <<http://design.umn.edu>>.



College of Liberal Arts

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CLA

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College of
Liberal Arts



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 149 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 1999. 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 Services unit, which offers academic advising and other services. Student Services staff helps 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

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 at the University, they should contact the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2008) <admissions.tc.umn.edu>. Admissions advisers will answer questions, provide information, and arrange meetings with faculty. The Office of Admissions schedules campus tours and information meetings for prospective students. Please call two weeks in advance, if possible.

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 post-secondary 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. All freshman applicants are considered for admission on the basis of high school rank, satisfaction of preparation requirements, any college courses and grades, and scores on college entrance tests. See "Freshman Admission" in the General Information section of this catalog.

A strong pattern of college preparatory coursework throughout high school may enhance students' admissibility. Students who do not continue such a pattern of coursework through grade 12 may compromise their chances of admission, particularly if they are in the "individual review" category.

In addition to preparation requirements, the basic criterion for admission has been an index that combines high school rank percentile and standardized test scores. In fall 1999, 64 percent of CLA freshmen ranked in the top quarter of their class or had high school rank percentiles of 75 or higher. 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 semester (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 only admitted in spring semester 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 may be admitted to the honors program when they first enroll in the college or transfer to the program at any time provided they have at least three semesters remaining before graduation (ordinarily before 75 credits are completed). A 3.50 GPA is required for admission. Students with 90 or more quarter or 60 or more semester completed degree credits also must be endorsed by the honors faculty representative in their major department. Applications from CLA and transfer students are accepted throughout the year. For information about application procedures, consult the CLA Honors Division, University of Minnesota, 115 Johnston Hall, 101 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-5522) <<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 (Adult Special)/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 Westbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-3333).

Advising services for CLA non-degree seeking students are available in 114 Johnston Hall (612-624-4545). 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 Dance Program 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.

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,

The median high school rank for new CLA honors students is in the 96th percentile.

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.

<i>African and Afro-American studies</i>	<i>History</i>
<i>American Indian studies</i>	<i>Individualized studies (major only)</i>
<i>American studies</i>	<i>Interdepartmental major (major only)</i>
<i>Ancient Near Eastern studies (major only)</i>	<i>Italian studies</i>
<i>Anthropology</i>	<i>Japanese</i>
<i>Architecture</i>	<i>Jewish studies</i>
<i>Art</i>	<i>Journalism</i>
<i>Art history</i>	<i>Latin</i>
<i>Astronomy</i>	<i>Linguistics</i>
<i>Biology</i>	<i>Mathematics</i>
<i>Chemistry</i>	<i>Microbiology (major only)</i>
<i>Chicano studies</i>	<i>Music</i>
<i>Child psychology</i>	<i>Music education (major only)</i>
<i>Chinese</i>	<i>Music therapy (major only)</i>
<i>Classical and Near Eastern archaeology</i>	<i>Philosophy</i>
<i>Classical civilization</i>	<i>Physics</i>
<i>Computer science</i>	<i>Physiology (major only)</i>
<i>Cultural studies and comparative literature</i>	<i>Political science</i>
<i>Dance</i>	<i>Psychology</i>
<i>Economics</i>	<i>Religious studies</i>
<i>English</i>	<i>Russian</i>
<i>Film studies</i>	<i>Scandinavian languages and Finnish</i>
<i>French studies</i>	<i>Sociology</i>
<i>French and Italian studies (major only)</i>	<i>Spanish studies</i>
<i>Geography</i>	<i>Spanish and Portuguese studies</i>
<i>Geology and geophysics</i>	<i>Speech-communication</i>
<i>German studies</i>	<i>Speech and hearing science</i>
<i>Global studies</i>	<i>Statistics</i>
<i>Greek</i>	<i>Theatre arts</i>
<i>Hebrew</i>	<i>Urban studies</i>
	<i>Women's studies</i>

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
Russian area studies
South Asian and Middle Eastern area 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

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 Afro-American and African studies, American studies, classical civilization, cultural studies and comparative literature, East Asian studies, European area studies, film studies, individually designed interdepartmental major, international relations, Jewish studies, Latin American studies, Russian area studies, South Asian and Middle Eastern area 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—The I.D.I.M. 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 I.D.I.M., they may wish to consider the B.I.S. degree. For this degree, students design an individualized program

Find it

A listing of CLA departments and phone numbers can be found on page 154.

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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 I.D.I.M.—student initiative in proposing courses, close contact with faculty advisers, highly individualized programs. It differs from the I.D.I.M. 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, please see the Degree Programs starting on page 155 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 credits in a single department or program. It is not a requirement for graduation, but is an option for all students.

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 semester 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 semester 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 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 semester 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.

CLA students can take advantage of over 1,300 different internship programs through the Office for Special Learning Opportunities (OSLO).

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 Office for Special Learning Opportunities.

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 semester credits from the University of Minnesota, at least 24 of which must be taken 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. At least half of the CLA credits applied toward the degree (never fewer than 24) must be graded A-B-C. 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 CLA credits.

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 quarter 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 the Policies section or page 35 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. Contact your 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 appropriate language department 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 which majors are assigned to which communities, contact the assistant dean's office for CLA Student Services at 612-625-3846.

Advising for Special Programs

Honors Division—115 Johnston Hall (612-624-5522) <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

Office for Special Learning Opportunities (OSLO)

220 Johnston Hall and 345 Fraser Hall (612-624-7577) <www.oslo.umn.edu/>

OSLO coordinates career services, internships, and community involvement opportunities for CLA students and assists them with independent and directed study options. OSLO's Web site "CLA Link" <<http://oslo.cla.umn.edu>> enables students to post their resumes online and search job, internship and volunteer opportunities. OSLO 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.

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 an OSLO adviser for information on both credit and the grant program.

One-third of CLA's programs rank in the top 20 in the nation.



Community Involvement Programs (CIP)—CIP 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 courses or cocurricular experiences that enrich and enhance an academic program. 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.

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 OSLO 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 OSLO 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 consult 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 Office for Special Learning Opportunities, 220 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.

OSLO 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. OSLO 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,
e-mail clasb@tc.umn.edu
Web site <www.tc.umn.edu/nlhome/g159/casb/>)

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.

Find it



Find undergraduate
advising
information at
<[www.cla.umn.edu/
class](http://www.cla.umn.edu/class)>

College of
Liberal Arts

Directory

(area code 612)

Department of Afro-American and African Studies

808 Social Sciences Building
624-9847

Department of American Indian Studies

107 Scott Hall
624-1338

Program in 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

Center for Austrian Studies

314 Social Sciences Building
624-981

Department of Chicano Studies

107 Scott Hall
624-6309

Classical Civilization Program

300 Folwell Hall
625-7565

Department of Classical and Near Eastern Studies

330 Folwell Hall
625-5353

Center for Cognitive Sciences

205 Elliott Hall
625-9367

Department of Communication Disorders

115 Shevlin Hall
624-3322

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 Hall
624-1503

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

Area Studies Programs

214 Social Sciences Building
626-1821

Center for German and European Studies

309 Social Sciences Building
625-1557

Modern Greek Studies

325 Social Sciences Building
624-4526

International Relations Program

214 Social Sciences Building
624-7346

Department of History

614 Social Sciences Building
624-2800

Center for Holocaust and Genocide Studies

100 Nolte
626-2235

Humanities Institute

101 Nolte
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

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 and Asian and Slavic Languages and Literatures

214 Nolte
624-3331

MacArthur Interdisciplinary Program on Peace and International Cooperation

260 Social Sciences Building
624-0832

Center for Medieval Studies

131 Nolte
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

Department of Speech-Communication

225 Ford Hall
624-5800

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

Center for Interdisciplinary Studies of Writing

227 Lind Hall
626-7579

Student Board

172 Norris Hall
626-0348

CLA offers more than 60 majors and preparation for 16 professional degree programs.

College of Liberal Arts

Degree Programs

Afro-American and African Studies

Department of Afro-American and African Studies

B.A.

This major offers four 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 Afro-American studies track provides a comprehensive knowledge of Afro-American history, psycho-social issues, and culture. The African studies track focuses on the history, social sciences, and cultures of Africa. The Arabic-Islamic Africa track focuses on the Arabic language and the history and culture of Islamic Africa. All four 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 Afro-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 credits, including a 3xxx, 4xxx, or 5xxx statistics or methods course approved by the undergraduate adviser; sequences in Afro-American history and/or African history; 15 credits in group concentration and breadth requirements; at least 3 credits from a course that examines gender issues; one 4xxx or 5xxx level seminar or proseminar; and a senior paper. Students may receive a maximum of 6 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 Afro-American and African Studies for details. Students selecting this major must 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. For the Arab-Islamic Africa track, six semesters of Arabic are required.

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. 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 on bond paper to the undergraduate adviser for inclusion in the department's collection. Students register for Afro 3991-3992—Senior Paper.

Minor Requirements

Students must satisfactorily complete 18 credits from 3xxx, 4xxx, or 5xxx courses. No more than 4 credits may be credited toward the minor for language study, and no more than 3 credits may be accepted from directed/independent study. For approved internships students may receive up to 3 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 interrelations among history, culture, language, literature, the arts, philosophy, religion, political and social forces, and the legal status and sovereignty of Indian nations. Two tracks in the major (language focus and non-language focus) and a minor are offered.

Preparatory Coursework—Students take AmIn 1001—Introduction to American Indian Studies.

Degree Requirements

Students must complete at least 120 credits to graduate, including AmIn 1001—Introduction to American Indian Studies 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 (16 credits) sequence in Dakota (AmIn 1101-1102-3103-3104) or Ojibwe (AmIn 1121-1122-3123-3124) language

At least 18 more credits, 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

Non-Language Focus

At least 30 credits, including at least 6 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

Final Project

The CLA senior project requirement may be satisfied by any one of the following courses: AmIn 4991, 4994, or 4996.

Minor Requirements

Students take AmIn 1001—Introduction to American Indian Studies 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, or 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, history, and an additional area of American society plus one course in world cultures. Four courses within this major sequence must be concerned with ethnic or women's studies.

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 the 3xxx level 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). Some internships may be used to satisfy major requirements.

Minor Requirements

Students take at least 15 credits of American studies courses. All courses must be at the 3xxx level 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 societies and cultures, past and present. Anthropologists are particularly interested in the connections between pervasive cultural forms and social institutions on the one hand, and the experience of everyday life on the other. Anthropological study encourages critical perspectives on one's own social forms and cultural assumptions, and on forms of difference that cut across societies and cultures.

Preparatory Coursework—Students must have completed both Anth 1001—Human Origins and Anth 1003—Understanding Cultures with a C- or better.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 30 credits in the major. In general, all students take introductory-level courses in both sociocultural anthropology and archaeology. Students wishing to concentrate in sociocultural anthropology take an intermediate-level and advanced course in method and theory in sociocultural anthropology; archaeology students take an intermediate-level and advanced-level course in archaeological theory and methods. All students take either a senior seminar, for which they write a substantial research paper, or an individualized senior research project carried out under the supervision of a faculty member. All students take four electives, one in each of the following three areas: advanced approaches (theoretical and methodological approaches); ethnography and regional studies; and institutions and issues.

Required Courses

Introductory Courses

Anth 1001—Human Origins

and Anth 1003—Understanding Cultures

or Anth 1011—Human Origins (Honors)

and Anth 1013—Understanding Cultures (Honors)

Intermediate Method and Theory Courses

Archaeology students: Anth 3001—Introduction to Archaeology

Sociocultural anthropology students: Anth 3003—Cultural Anthropology

Advanced Method and Theory Courses

Archaeology students: Anth 4001—Advanced Method and Theory in Archaeology
 or Anth 4990—Topics in Archaeology: Seminar, as approved by the director of undergraduate studies

Sociocultural anthropology students: Anth 4003—Contemporary Perspectives in Cultural Anthropology

Senior Seminar/Project

Anth 4011—Senior Seminar
 or Anth 4013—Senior Project

Anth 4013 is required for honors students; other seniors can choose between the two.

Anthropology Electives

Four courses; at least one from each of the following three categories—

Advanced approaches—Anth 3005, 3007, 3009, 3221, 3310, 4015, 4019, 4021, 4023, 4025, 4029, 4031, 4033, 4035

Ethnographic and regional studies—Anth 3010, 3011, 3013, 3017, 3019, 3020, 3023, 3025, 3027, 3029, 3031, 4043, 4045, 4047

Institutions and issues—Anth 3041, 3043, 3045, 3047, 4051, 4053, 4057, 4061, 4065, 4067, 4069, 4071, 4073, 4980, 4991, 4992, 4993, 4994

Electives—

Clas 3340—Practicum in Archaeological Field and Computer Techniques

Clas 5120—Field Research in Archaeology

Clas 5340—Practicum in Archaeological Field and Computer Techniques

Final Project

Anth 4011—Senior Seminar or Anth 4013—Senior Project. Anth 4011 is an in-depth examination of a prominent topic or issue in sociocultural anthropology or archaeology; students who take the senior seminar are required to write a substantial (i.e., 20 to 25 page) research paper to complete the course. Anth 4013 is an individualized research project, in many cases based on an internship or fieldwork, which students design and conduct under the supervision of a faculty member. Anth 4013 is required for honors students; other seniors can choose between Anth 4011 and 4013.

Minor Requirements

Students take at least 14 credits of anthropology courses at the 3xxx level or above. Specific coursework is worked out 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 B.S.Arch. program.

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 technology emphasizing the development of architecture as a language of form, space, and order. The B.A. with a major in architecture 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 B.A. 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 strong 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.

Admission Requirements—Students apply to the major the semester they will complete 55-60 credits. Students are admitted to the major based on space availability and academic record.

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. (Premajor Advising, 30 Johnston Hall, 612-624-9006; Martin Luther King Program (MLK), 19 Johnston Hall, 612-625-2300; CLA Honors Program, 115 Johnston Hall, 612-624-5522)
3. Meet with the Department of Architecture undergraduate adviser in the CALA Office of Student Services, 612-624-7866. Bring a copy of the completed Pre-Architecture Planning Sheet and a current unofficial transcript to the appointment.

Degree Requirements

To complete the B.A., 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 39 credits must be in the major.

During their B.A. 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)****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 3401—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)

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*.

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 Major Requirements (21 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 5xxx—Student's choice within area of interest (6 cr minimum)

Upper division courses outside of architecture (18 cr minimum)

Minor Requirements

An undergraduate minor in architecture introduces the foundational ideas of the discipline as a social, cultural, historic, and environmental construct. An undergraduate minor in architecture 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 3401—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 architecture adviser in 110 Arch 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.

Accelerated Status in Architecture

See B.S.Arch. under the College of Architecture and Landscape Architecture.

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 39 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 16 credits (usually four courses) at 3xxx or above (1 course may be at the 1xxx level), and 2 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 above will apply to the major.

Registration for a major project (1 credit) is required in the senior year.

Required Courses

ArtS 1001—Introduction to Visual Arts

Two-dimensional expression:

ArtS 1101—Drawing

or ArtS 1102—Painting

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 ArH (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 of 10-12 slides 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 two-dimensional expression, a course in three-dimensional concepts, a course in the reproducible media, and an elective ArtS course at the 1xxx level.

Major coursework requires ArtS 3401 (3 credits), ArtS 5400 (3 credits), three courses in the history of art, an internship experience (1-3 credits), and a minimum of 30 credits (10 courses) 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 above apply to the major.

Required Courses

Arts 1001—Introduction to Visual Arts

Two-dimensional expression: Arts 1101—Drawing
or ArtS 1102—Painting

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 3401—Critical Theories and Their Construction From a Studio Perspective

Arts 3496—Internship in the Arts

ArtS 5400—Seminar: Concepts and Practices in Art

32 cr ArtS 3xxx or above

9 cr ArtH (6 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

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.

Minor Requirements

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 above 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, 1102, 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.

Minor Requirements

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.

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 (8 cr); and Phys 1301-1302-2303 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)
Two 4xxx or 5xxx courses in astronomy (8 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)
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.

Minor Requirements

Ast 1001—Exploring the Universe (4 cr)
or Ast 1011—Exploring the Universe (4 cr), Honors
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.

See the College of Biological Sciences section for the B.S. in biology.

Students in this program develop the skills necessary to tackle complex problems within the biological sciences. Biology examines the fundamental concepts of nature and all aspects of the living environment, from the molecular level to the biosphere. Biology can open doors to many specialized fields, including genetics, biotechnology, environmental biology, and medicine.

The biology B.A. program can prepare students for further study in graduate or professional schools or careers in industry, education, or government.

Degree Requirements

Students must complete at least 120 credits to graduate, 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.

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/MicB/VPB 2032, Biol 2012, Biol 2022, Biol 3211 and Biol 2005, Biol 3002 and Biol 3005, Biol 3007, Biol/MicB 3301

More than 80 CLA
faculty members
have received
awards for
outstanding or
distinguished
teaching.

Sequence B.

Biol 1009—General Biology

Choose two organismal biology courses or course pairs from the following list: Biol/MicB/VPB 2032, Biol 2012, Biol 2022, Biol 3211 and Biol 2005, Biol 3002 and Biol 3005, Biol 3007, Biol/MicB 3301

Note: Grades in all chemistry, math, physics, and biology courses must be at least C-. All courses in the major must be taken A-F unless the course is only offered S-N.

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry

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:

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 3005 and Biol 3007, Biol/MicB 3301 or Biol 2032, if not used to satisfy the general and organismal biology requirement.

Biol/NSc/Phsl 3105 and 3115, Biol 4125, BioC 4025, BioC 4994**, EEB 4014, EEB 4016, EEB 4129, EEB 4134, EEB 4136, EEB 4605, EEB 4607, EEB 4631, EEB 4994**, GCB 4015, GCB 4025, GCB 4111, GCB 4994**, MicB 4215, MicB 4235, MicB 4994**, NSC 4994**, PBio 4321, PBio 4404, PBio 4511, PBio 5416, PBio 4994**

All CBS courses offered at the Lake Itasca Forestry and Biological Station are acceptable

Required Courses From Other Programs

Note: Grades in the following courses must be at least C-.

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 1201-1202—General Physics I-II

or Phys 1301-1302—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 4994 course number.

Biology majors may satisfy both of the lab/field course requirements through Directed Research only if 3 credits of 4994 are completed in each of two different labs. A maximum of 6 credits of 4994 will count toward the 11 upper division elective credits.

Beginning fall 2001, the B.A. in biology will no longer be offered. See the B.S. in biology offered through the College of Biological Sciences.

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 35 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 (31 cr)

Advanced chemistry lab elective (2 cr)

Directed research (2 cr)

Total credits in chemistry (35 cr)

Mathematics (12 cr)

Physics (8 cr)

Advanced technical electives (3 cr)

Introductory biology (4 cr)

Composition (4 cr)

Liberal education plus electives (54 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 (3 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

Advanced technical elective (3-4 cr)

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 and literary methodologies and perspectives that represent the early colonial conquest and the assimilation of Indians and African slaves into the new societies of the Caribbean, Mexican, Central and South American peoples. Students explore germinal texts that portray the history of Cuba and Puerto Rico as well as the Mexican colonial history of the Southwest from 1598 to the present. 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 sequence, Chic 1105 and Chic 1106 in the first or second year. This yearlong survey familiarizes students with major historical figures, geography, and topics of study. Some courses at the 3xxx-level explore issues of history, literature, and gender in the study of Chicanos. Students must also complete a senior paper in Chic 5993.

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 that indicates 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).

Minor Requirements

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.

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.

Preparatory Coursework—Students take CPsy 2301—Introductory Child Psychology and Psy 1001—Introduction to Psychology in preparing 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, Psy 3801, 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 4310) that may include literature review or research.

Minor Requirements

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)

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

Through the JASON
Project, the
University's Bell
Museum works
directly with Titanic
discoverer Dr.
Robert Ballard on
distance learning
programs for young
people.

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
 One CPsy elective (4 cr)

Final Project

Senior project CPsy 4310 (2 cr) (either literature review or research project) must be completed before graduation.

Minor Requirements

Students take the required preparatory courses: CPsy 2301—Introductory Child Psychology and Psy 1001—Introduction to Psychology. To complete the minor, students take CPsy 3308—Introduction to Research Methods; two courses (8 cr) from CPsy 4329, 4331, 4343; and one CPsy elective (4 cr).

Chinese

Institute of Linguistics and Asian and Slavic Languages and Literatures

B.A.

The program aims to establish a solid linguistic foundation for students. At the same time, it introduces the richness of Chinese literature through panoramic overviews in English and selected readings in the original language.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 36 credits in the major.

The curriculum has three course categories: language sequences, surveys (in English), and topics/studies courses.

Required Courses

Preparatory Coursework

Chn 1011-1012—Beginning Modern Chinese (5-5 cr)
 or Chn 1015—Accelerated Beginning Modern Chinese (5 cr)
 Chn 3021-3022—Intermediate Modern Chinese (5-5 cr)

Note: Students who do not earn grades of B or higher in the premajor courses may not be prepared to complete the major requirements.

Major Requirements (36 credits)

Chn 3031-3032—Advanced Modern Chinese (4-4 cr)
 Chn 3111-3112—Introductory Classical Chinese (4-4 cr)
 Chn 4121—History of the Chinese Language (3 cr)
 or Chn 4125—Structure of Modern Chinese (3 cr)
 Chn 4011 or 4012—Chinese Traditional Literature in Translation (4-4 cr)

12 credits from the following two categories:

Literature in English Translation (4-8 cr)

Chn 4023—20th-Century Chinese Literature in Translation (4 cr)
 Chn 4024—Contemporary Chinese Literature in Translation (4 cr)
 Chn 4234—Chinese Poetry in Translation (4 cr)
 Chn 4235—Chinese Fiction in Translation (4 cr)
 Chn 4241—Filmic Construction of Modernity in China (4 cr)

Literature in the Original (4-8 cr)

Chn 5015—Chinese Philosophical/Historical Texts (4 cr)
 Chn 5018—Chinese Religious Texts (4 cr)

Chn 5230—Topics in 20th-Century Chinese Literature (4 cr)
 Chn 5240—Topics in Chinese Poetry (4 cr)
 Chn 5242—Chinese Classical Drama and Theatre (4 cr)
 Chn 5250—Topics in Chinese Fiction (4 cr)
 Chn 5260—Topics in Pre-modern Chinese Prose (4 cr)
 Senior project (1 cr)

Electives—Students are strongly encouraged to take courses on Chinese civilization and culture in related disciplines.

Language Requirements

The CLA requirement of two years of a foreign language is fulfilled by the preparatory coursework, which is two years of Modern Chinese.

Final Project

A senior project is required. Students taking a survey or topics/studies course may do a senior project concurrently with the same instructor.

Minor Requirements

Required preparatory courses:

Chn 1011-1012—Beginning Modern Chinese (5-5 cr)
 or Chn 1015—Accelerated Beginning Modern Chinese (5 cr)
 and Chn 3021-3022—Intermediate Modern Chinese (5-5 cr)
 Two additional surveys or topics/studies courses

Classical and Near Eastern Archaeology

Department of Classical and Near Eastern Studies

B.A.

This new 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 3176/5960—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 the Departments of Classical and Near Eastern Studies, Anthropology, Art History, Geography, Geology, History, and History of Science. Course selections are subject to the approval of the director of undergraduate studies.

Minor Requirements

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, satisfying the CLA language requirement in Greek or Latin and earning at least 36 credits in the major in twelve approved courses, eight of them at or above the 3xxx level, including two courses with the C1Cv 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 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.

Minor Requirements

In addition to satisfying a language requirement (at least two courses in either the Greek or the 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.

Computer Science

Department of Engineering and Computer Science

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 modified GPA of 2.70 (all grades from repeated attempts of each grade count) in the required math and CSci courses listed below, and must complete all these courses with a grade of C- or better.

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

CSci 1901—Structure of Computer Programming I

CSci 1902—Structure of Computer Programming II

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 nonrequired 4xxx or 5xxx CSci courses; (3) contains at most one CSci 59xx or 4970 course. 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

The major project requirement may be fulfilled either by taking CSci 4970—Advanced Project Laboratory (this requires finding a suitable project and a faculty member willing to supervise the project), or by taking one of the following courses: 5107, 5115, 5512, 5801, 5802. (This list will be updated periodically.) To fulfill the senior project requirement a course must contain a project that is substantial both in terms of time and scope. It should require at least six weeks of work and involve a number of different tasks such as designing, implementing, testing, and documenting a significant computer program. The project may be done in groups, and the course fulfilling the project, whether 4970 or one of the other courses, may be used as part of the upper division emphasis.

Minor Requirements

The minor consists of at least five 3- or 4-credit approved computer science courses. All courses must be taken A-F and only courses completed with a grade of C- or better count toward the minor. At least three courses must be CSci courses taken at the University. Up to two courses may be taken in another department or institution if they are equivalent to a CSci course. At least one course must be at the 5xxx level. Only computer science courses for majors are acceptable. In particular, 11xx-level CSci courses.

Cultural Studies and Comparative Literature

Department of Cultural Studies and Comparative Literature

B.A.

Both cultural studies and comparative literature study the ways cultures produce and reproduce themselves over time through close “readings” of their artifacts and practices. Comparative literature focuses on written texts and reading practices among different national traditions, while cultural studies ranges more widely, studying the meanings of the cultural world around us and the ways these meanings are central in creating us—individually and collectively. Both areas draw on interdisciplinary methods to show how texts and practices perform cultural “work”: advancing ways of knowing, systems of values and beliefs, and social-political organizations. Basic courses explain common critical methods for reading culture. More advanced courses examine particular historical moments, cultural sites, or cultural practices. All cultural studies and comparative literature courses develop ability to analyze texts and processes, explain them in terms of history and theory, and express what we find in clear writing and speaking. The major provides a strong basis for professional and graduate study and its courses are a central component of liberal arts or interdisciplinary programs.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 32 credits in the major. The B.A. program offers two tracks, a cultural studies track and a comparative literature track.

Students select a track and complete a minimum of ten courses for the major: two introductory (1xxx level) courses plus seven at upper division levels. To allow for flexibility, the tenth course may be taken at any level. Requirements for the different 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
 CSCL 1201—Introduction to Visual Cultures
 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

Comparative Literature Track

CSCL 1101—Introduction to Literary Cultures
 or CSCL 1401—Reading Literature: Theory and Practice
 CSCL 1201—Introduction to Visual Cultures
 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

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.

Minor Requirements

Students take one 1xxx course plus 14 additional credits at the 3xxx, 4xxx, or 5xxx levels.

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 must complete at least 120 credits to graduate, including at least 43 credits in the major.

The 43 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 4 credits of dance technique electives and 10 credits of dance-related academic electives. Major coursework must be taken A-F.

Since 1992 the dance program has been invited to four consecutive National American College Dance Festivals at the Kennedy Center in Washington, DC.

Required Courses

- Dnce 1500—Topics in Dance: Survival Strategies in Dance (1 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 4443—Philosophy and Aesthetics (3 cr)
- Dnce 4901—Senior Seminar (2 cr)
- Technique electives (1 or 2 credits each; 4 credits required)
- Dance-related academic electives (1-3 credits each; 10 credits required)

Electives—The dance-related academic 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 10 credits of dance-related academic electives. Major coursework must be taken A-F.

Required Courses

- Dnce 1500—Topics in Dance (1 cr)
- Dnce 1500—Topics in Dance: Dance Production (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 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 5858—Teaching Dance (4 cr)
- Technique electives (1 or 2 cr each; 7 credits required)
- Dance-related academic electives (1-3 cr each; 10 credits required)

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.

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.

Note: In fall 2000, the Institute plans to make available a new major in global studies. At that time, students will no longer be able to declare a major in East Asian studies. Students who have already declared this major will be allowed to complete it or to change to the global studies major. For more information, contact the Global Studies adviser, 232A Social Sciences Building (612-624-9353).

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 up to two upper division courses 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 only (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 campus.

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—A maximum of two courses 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 4501, 4611, or 4821 recommended or any 4xxx ApEc course

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.
- Acceptable honors (up to 6 credits) projects or theses.

Minor Requirements

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 level) 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 4109, 4113, 4731 or 4741

Econometrics Minor

Math 1271-1272—Calculus I-II (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 1271-1272—Calculus I-II (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 4619—Environmental Valuation

or Econ 4623—Housing Markets and Public Policy

Econ 3801 or 4831 or 5821

Recommended: Econ 4211—Principles of Econometrics

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

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 up to two upper division courses 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 campus.

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

Electives—A maximum of two courses 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 4501, 4611, or 4821 recommended or any 4xxx ApEc course
Fina 3001
Math 4065, 4606, 5615-5616

Minor Requirements

Economics offers six minors; see B.A. degree.

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 up to two upper division courses 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 campus.

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 3011—Introduction to Statistical Analysis
Stat 3022—Data Analysis

Electives—A maximum of two courses 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 4501, 4611, or 4821 recommended or any 4xxx ApEc course

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.
- Acceptable honors (up to 6 credits) projects or theses.

Minor Requirements

Economics offers six minors; see B.A. degree.

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 (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 1001-1402, EngW 1101-1104, and EngC 1601. To declare a major, a student should make an appointment with the Undergraduate Studies Office (225 Lind Hall; 612-625-4592; englmaj@tc.umn.edu).

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 35 credits in the major (31 credits from 3xxx or higher courses). Credits are distributed among textual interpretation, historical survey of literature, Shakespeare, English language or theory, elective courses, and a senior paper. All English major courses must be taken A-F and completed with grades of C- or better. Exception: senior paper course, EngL 3882 or 3884, is taken S-N.

Based on a survey
taken every 10
years, the
economics program
ranked #10
nationwide in the
National Research
Council's 1995
report.

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 offered on occasion through the University's Global Campus Literature and Theatre in London study abroad program

One of the following literary theory or English language courses:

EngL 3002, 3612, 3613; EngC 3601, 3602, 3603, 3605, 3606, 3611, 3621, 3632, 3633, 3641, 3650 (topics in rhetoric/writing/language)

Electives

Four courses (minimum 12 cr), to include at least three 3xxx courses (9 cr) and one 1xxx or 3xxx course (3-4 cr).

Final Project

Each student produces a senior paper in a 3xxx course (other than foundation courses), subject to department guidelines and faculty written approval. Students must also register for EngL 3882—Senior Paper (1 cr) or EngL 3884—Honors: Senior Paper (1cr). Honors *summa cum laude* degree candidates must also register for EngL 3883—Summa Thesis (3 cr).

Minor Requirements

Students take EngL 3001—Textual Interpretation, EngL 3007—Shakespeare, two historical survey courses, and one elective.

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.

Note: In fall 2000, the Institute plans to make available a new major in global studies. At that time, students will no longer be able to declare a major in European area studies. Students who have already declared this major will be allowed to complete it or to change to the global studies major. For more information, contact the Global Studies adviser, 232A Social Sciences Building (612-624-9353).

Film Studies

B.A.

Film studies is an interdepartmental program that offers students the opportunity to examine film from aesthetic, historical, political, social, technical, and theoretical perspectives.

Among the departments offering film studies courses are Afro-American and African Studies; American Indian Studies; American Studies; Art History; Cultural Studies and Comparative Literature; East Asian Languages and

Literatures; English; French and Italian; German, Scandinavian, and Dutch; Journalism; and Women's Studies.

Degree Requirements

Students must complete at least 120 credits to graduate, including 33 credits in approved major courses. All courses must be taken A-F. Besides required courses, students take seven additional 3xxx-5xxx courses selected from approved electives, including one director course, one genre course, and one national cinema course. The seven courses must include at least one 5xxx course and, if possible, a 3xxx course designated as a junior-senior film studies seminar.

Required Courses

Arth 1921—Introduction to Film Study

or CSCL 1921—Introduction to Film Study

Arth 3921—Art of the Film

CSCL 5751—Basic Concepts of Cinema

Jour 4615—History of Visual Communication in the Mass Media

Final Project

The major project requirement is satisfied by the term paper for either the junior-senior seminar or for another course designated as an appropriate substitute and approved by a member of the film studies committee.

Minor Requirements

Students must take Arth 1921—Introduction to Film Study, Arth 3921—Art of the Film, CSCL 5751—Basic Concepts of Cinema, Jour 4615—History of Visual Communication in the Mass Media, and two additional 3xxx, 4xxx, or 5xxx courses selected from approved electives. The minor program must be approved by a member of the film studies committee.

Foreign Studies

Minor Only

The foreign studies minor helps students integrate their study abroad with supporting University coursework from a variety of disciplines. Because several 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@tc.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 or must appear on the student's University transcript as residence credit under appropriate FoSt course numbers.

Spch 3451—Intercultural Communication: Theory and Practice (before departure)

Spch 3452—Communication and the Intercultural Reentry (after return)

Nine credits of 3xxx, 4xxx, or 5xxx courses focusing on the country of study. At least one course must be taken before departure and one after return. At least one course must be in the humanities (e.g., literature, art history), at least one in history, and at least one in the social sciences (e.g., geography, political science).

Two years (four semesters) in a foreign 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

Find it

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/](http://www.umn.edu/~clasb)

>.

College of
Liberal Arts

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 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 the 3xxx and 5xxx levels. All students complete a final project, written 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.

Minor Requirements

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 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 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 describes and explains the past, present, and future locations and spatial patterns of humans and their settlements, cultural and economic traits, and natural environment and resources. The language of maps is a distinctive language of geography, and an ability to use and interpret maps is fundamental to the study and practice of the discipline. Geography offers students an integrative perspective on the relations among social, political, economic, and physical phenomena in space and place.

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, analysis, and representation.

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 National
Research Council
ranked the
geography program
#3 in the nation in
their 1995 report.

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 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 about different ways of life and conceptions of development or well-being of people in different places. They also learn about the connectedness of societal and environmental processes from local to global levels.

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, analysis, and representation 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.

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. A minimum of 15 geography credits must be taken after declaring the major.

Required Courses

Core courses: Geog 1301—Introduction to Human Geography or 3001—Geographic Inquiry and Human Development and two of the following: Geog 3371, 3401, 3561.

Geog 4001—Modes of Geographic Inquiry

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.

Minor Requirements

Students complete a minimum of 14 credits in 3xxx, 4xxx, or 5xxx courses, with a grade of C- or better.

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, analysis, and representation 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 3401—Geography of Environmental Systems; Geog 3561—Principles of Geographical Information Science and one of the following: Geog 1301, 3001, or 3371

Geog 4001—Modes of Geographic Inquiry

Mathematics through Math 1272 or through Math 1372; or statistics through Stat 3022; or computer science (CSci 1107 and 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.

Minor Requirements

Students complete a minimum of 14 credits in 3xxx, 4xxx, or 5xxx courses with a grade of C- or better.

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

Minor Requirements

Students take Geo 1001—The Dynamic Earth: An Introduction to Geology or equivalent and 14 credits of geology or geophysics taken at 2xxx level 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. There is a major and minor in German studies and a minor in Dutch studies; these major and minor programs 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 minor. The University is affiliated with exchange programs in Berlin and Freiburg for both one- and two-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—for example in art history, history, political science, philosophy, or international relations—if the course examines German-speaking areas, subject to the approval of the director of undergraduate studies. 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.

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.

Minor Requirements

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).

The German program is ranked 11th in the nation according to the National Research Council.

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 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—International Relations: Practice and Theory (4 cr)

GloS 3144—Introduction to Area Studies (4 cr)

Ways of Knowing requirement—3-4 credits

Students complete a 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 will be counted toward the thematic or regional concentrations where appropriate.

Final Project

Students complete a senior project integrating their thematic and regional concentrations.

Minor Requirements

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)

Major 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.

Minor Requirements

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

All students take 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.

Major 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.

Minor Requirements

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), and methods (economic, social, quantitative). Interdisciplinary programs incorporate history into a variety of other programs (e.g., history of medicine, international relations, various area studies majors, women’s studies).

Degree Requirements

There are no prerequisites for the undergraduate major. Students take three introductory courses (including one in world history and one writing-intensive course at the introductory level), six courses above the 1xxx level, including three in an area of concentration, and a senior paper course. 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 1011, 1012, 1013, 1014, 1017, 1018, 3421, 3422.
3. **Area of concentration**—At least three courses, 3xxx or higher, that represent either a geographical area, a chronological period, or a unifying theme, method, or subject.

An honors major with special courses is offered.

Required Courses

Students must take three of the following introductory survey courses:

Hist 1011, 1012, 1013, 1014, 1017, 1018 (world history)

Hist 1026, 1027, 1031, 1032, 1033, 1034 (European civilization)

Hist 1301, 1302, 1303, 1304, 1307, 1308 (U.S. history)

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—Major Paper).

Minor Requirements

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 courses; at least 4 of these credits must be at or above the 4xxx level. 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; 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 the 1xxx level. 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 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 I.D.I.M. 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.

I.D.I.M. 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 I.D.I.M. adviser, students develop program proposals that explain their academic goals and list a set of courses appropriate for meeting those goals. I.D.I.M. 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 I.D.I.M. adviser for specific information on proposal approval procedures and department guidelines.

The average freshman entering CLA ranks in the top 20 percent of his or her graduating high school class.



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 the 3xxx level 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.

International Relations

Institute for Global Studies

Note: In fall 2000, the Institute plans to make available a new major in global studies. At that time, students will no longer be able to declare a major in international relations. Students who have already declared this major will be allowed to complete it or to change to the global studies major. For more information, contact the Global Studies adviser, 232A Social Sciences Building (612-624-9353).

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, except courses 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.

Minor Requirements

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, except courses taught in English)

Japanese

Institute of Linguistics and Asian and Slavic Languages and Literatures

B.A.

The program allows students to study classical and contemporary Japanese language and society. Coursework includes three areas: language, literature and culture, and linguistics. Students must plan their major programs in consultation with faculty advisers.

Preparatory Coursework—Students take Jpn 1011-1012—Beginning Japanese and Jpn 3021-3022—Intermediate Japanese. All courses in the major program, including prerequisite courses, must be completed with a grade of C- or above.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 36 in the major.

Three years of language study are required. The major also includes courses in Japanese literature (including an introductory course in English translation and at least one course working with literary texts in Japanese) and in Japanese linguistics. Students must also complete a major project, normally in conjunction with a 5xxx course.

Required Courses

Requirements for the B.A. degree include language courses, a linguistics course, a course in literature in English translation, and three additional courses.

The language courses are: Jpn 3031, 3032—Third Year Japanese.

One of the following courses in Japanese linguistics must be taken: Jpn 3451, 5451, 5452, 5453, 5650.

The introductory literature course must be chosen from among Jpn 3162, 3163, and 3164.

Students must take four additional courses from the following list, including at least one 5xxx course: Jpn 3051, 3052, 3162, 3163, 3164, 3165, 3167, 3451, 4061, 4062, 5160, 5161, 5162, 5163, 5164, 5166, 5251, 5451, 5452, 5453, 5650.

Ling 3001—Introduction to Linguistics is a prerequisite for all Japanese linguistics courses.

Electives—Students are encouraged to take courses offered by other departments that focus on Japanese culture, such as art history, history, political science, or sociology.

Language Requirements

The program requires two semesters of study beyond the four-semester CLA requirement.

Final Project

Students must complete a senior project under the direction of a department faculty member. Students may choose to concentrate on linguistics or literature, and should select their elective 5xxx-level courses with the senior project in mind. Occasionally a special course is offered for juniors and seniors, which focuses on choosing a topic, reviewing literature, doing research in both English and Japanese sources, and structuring arguments in a piece of extended writing.

Minor Requirements

The requirements for a Japanese minor include Jpn 3021, 3022—Intermediate Japanese and two additional 3xxx or 5xxx Japanese courses.

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 literature, 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.

Major 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.

Minor Requirements

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 the 3xxx level or higher 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 tracks: professional and mass communication.

Admission Requirements—The school admits a limited number of undergraduates annually. A student should apply for formal admission to the major after completing Jour 1001 with at least a C-, and completing at least 30 graded (A-F) credits, including one semester of study (12 credits minimum with A, B, or C grades) in CLA. Admission to major status is required before enrolling in Jour 3004, which is a prerequisite for most other journalism courses. Majors are expected to have typing skills before enrolling in Jour 3101 or any advanced reporting, editing, or broadcast courses.

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, a grade of C- or higher in Jour 1001, and a score of 550 or above on the SAT II Writing Test to qualify for admission. 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 33 credits in the major. All major courses must be completed with grades of C- or higher.

About three-fourths 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 90 non-journalism credits, including 65 CLA credits. The introductory course Jour 1001—Introduction to Mass Communication (3 cr), counts toward the 90 non-journalism credits, but is also included as part of the 33 major credits.

Journalism courses are categorized in the following way.

Professional (skills) courses: 3101, 3121, 3155, 3159, 3173, 3179, 3201, 3241, 3251, 3321, 3451, 4131, 4155, 4159, 4171, 4174, 4261, 4263, 4321, 4441, 4442.

Enrichment courses: 3006, 3007, 3008, 3614, 3741, 3745, 3771, 3776, 3796, 4274, 4611, 4615, 4721, 4731, 4801, 5251, 5316, 5501, 5531, 5725, 5726, 5541, 5601, 5606, 5741, 5771, 5777, 5825.

Independent study and specialized topics courses: 3990, 3993, 3996, 4993, 5990, 5993.

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.

Required Courses

The required core course is Jour 3004—Information for Mass Communication.

At least 27 additional 3xxx, 4xxx, or 5xxx credits. This requirement includes 12 credits of mass communication core courses, including one course from each of these groups:

- I. History: Jour 3007, 3614, 5601, 5606, 4611, 4615
- II. International/Multicultural: Jour 3741, 5741, 4801, 5825
- III. Media Effects: Jour 3006, 3008, 5251, 5316, 5501, 5531, 5541
- IV. Media and Society: Jour 3745, 3771, 3776, 3796, 4274, 4721, 5725, 5726, 5771, 5777

The 27-credit requirement also includes 15 credits chosen in consultation with a faculty adviser from among the following: professional (skills) courses*, enrichment, topics, and independent study courses.

* With adviser approval, 1-3 professional (skills) courses are permitted, not required.

Supporting coursework includes at least 12 credits at the 3xxx, 4xxx or 5xxx level from other University departments, chosen in consultation with a faculty adviser after admission to the major.

Final Project

All journalism majors must complete a major project before graduation. For the mass communication track, this requirement is satisfied by completing two 4xxx or 5xxx enrichment courses.

Professional Track

The professional track prepares students for careers in journalism, advertising, and public relations. These careers include newspaper reporting and editing, magazine writing, broadcast news, corporate public relations, and advertising account services. This track is based on a broad liberal arts foundation, knowledge of the social and professional responsibilities of communicators, and basic competence in journalistic skills.

Required Courses

The required core course is Jour 3004—Information for Mass Communication.

Other requirements include at least 27 additional 3xxx, 4xxx, or 5xxx credits to include completion of either a journalism or advertising/public relations concentration.

Journalism Concentration

4 credits of journalism core course: Jour 3101—Newswriting and Reporting.

12 credits of professional (skills) courses chosen in consultation with a faculty adviser from the following list: Jour 3121, 3155, 3159, 3173, 3179, 3321, 3451, 3996, 4131, 4155, 4159, 4171, 4174, 4321, 4441, 4442, and 3990 or 5990 (specialized reporting courses, including Charnley course).

12 credits of enrichment, topics, or independent study courses chosen in consultation with a faculty adviser.

Advertising/Public Relations Concentration

3 credits of advertising/public relations core course: Jour 3159—Public Relations or Jour 3201—Principles of Advertising.

12 credits professional (skills) courses chosen in consultation with a faculty adviser from the following list: Jour 3179, 3241, 3251, 3321, 3996, 4159, 4261, 4263, 3990 or 5990 (specialized topics courses). With adviser's approval, 3101 may be used to meet this requirement.

12 credits of enrichment, topics, or independent study courses chosen in consultation with a faculty adviser.

Supporting coursework includes at least 12 credits at the 3xxx, 4xxx, or 5xxx level from other University departments, chosen in consultation with a faculty adviser after admission to the major.

Final Project

Majors must complete a major project before graduation. For the professional track, this requirement is satisfied by completing two professional (skills) courses (at least one must be 4xxx or 5xxx).

Minor Requirements

Students must complete 18 credits in the minor program. Jour 1001—Introduction to Mass Communication, Jour 3004—Information for Mass Communication, Jour 3101—Newswriting and Reporting or Jour 3159—Public Relations or Jour 3201—Principles of Advertising and three enrichment courses, one of which must be 4xxx or 5xxx.

Students must have a 2.80 overall GPA, a grade of C- or higher in Jour 1001, and a score of 550 or above on the SAT II Writing Test 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 mediaeval 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.

Required Courses

Prerequisites

Latin 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 Latin 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.

Minor Requirements

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

Latin 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 level or higher, 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.

Note: In fall 2000, the Institute plans to make available a new major in global studies. At that time, students will no longer be able to declare a major in Latin American studies. Students who have already declared this major will be allowed to complete it or to change to the global studies major. For more information, contact the Global Studies adviser, 232A Social Sciences Building (612-624-9353).

Linguistics

Institute of Linguistics and Asian 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 language is used in human social interaction, how languages are acquired by children and adults, and how they 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.

Related courses in other departments 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 or 3011
Ling 3301 or 5301
Ling 3601 or 5601
Ling 4901—Senior Project

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.
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.

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.

Minor Requirements

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 specializations in actuarial science and preparation for secondary school teaching 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 or secondary teaching 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 3283. Math 3283 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 or 5707 (only one of 5705 or 5707 may be used to satisfy this requirement), 5711.

To satisfy the analysis requirement, a student must take two courses from the following: Math 4606, 5486, 5525, 5535, 5583, 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 4457 and 4458—Methods of Applied Math I and II and Math 4512—Differential Equations with Applications cannot be used as part of the six-course upper division math requirement; Math 3113 and 3118—Topics in Elementary Mathematics I and II cannot be used as part of the six-course upper division math requirement nor as part of the technical elective.

Final Project

All CLA math majors must complete a senior project. Consult your math adviser about this project before the beginning of your senior year.

Minor Requirements

Students complete all lower division requirements for the major, plus two adviser-approved upper division courses, at least one of which must be in math.

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 the 3xxx, 4xxx, or 5xxx level 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 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.

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

Math 1271-1272—Calculus I–II

Chem 1021-1022—Chemical Principles I–II

Chem 2301-2302—Organic Chemistry I–II

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 Office of Special Learning Opportunities (OSLO).

Find it



Information about hundreds of internship opportunities with companies such as General Mills, Lucent Technologies, the U.S. Senate, and more can be found through OSLO at 612-624-7577 or <http://oslo.umn.edu>.

College of
Liberal Arts

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 612-626-2200, 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.

The University of
Minnesota
Marching Band has
nearly 300
members. It was
formed in 1892 as a
Cadet Corps with
only 29 musicians.



B.A. in Music

The B.A. program is for students who wish to major in music while enrolling in a diversified program of elective coursework outside the major.

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

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)

Mus 3230—Chorus or Mus 3410—University Wind Bands

or Mus 3420—Orchestra

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.

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

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 5007—Technology for Teaching and Learning
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 (36 cr)

Mus 1260—Voice Class
or MusA 1404—Secondary Voice
MuEd 1201—Introduction to Music Education
MuEd 3301—Teaching Elementary Vocal and General Music
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
MuEd 3350—Student Teaching in Classroom Music (4 cr)
MuEd 3550—Student Teaching in Instrumental Music (8 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 any of the following: Mus 3410—University Wind Bands, Mus 3480—Marching Band, 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 (25 cr)

MuEd 1201—Introduction to Music Education
MuEd 3301—Teaching Elementary Vocal and General Music
MuEd 3302—Teaching Secondary 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

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 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

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 (48 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).

CLA's Martin Luther King, Jr. (MLK) Program provides support, guidance, and information to enhance the undergraduate experience of students of color.

B.M. in Music-Jazz Studies

The B.M. program is for students who wish to complete professional studies in jazz. The program includes core studies in music, and coursework in the theory, history, and performance of jazz.

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 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

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

Six semesters to include 8 credits of MusA courses at the 13xx level and 4 credits of MusA courses at the 33xx level.

Concurrent enrollment in an appropriate ensemble is required during each semester in which a student is enrolled in applied music.

Ensembles

Eight semesters to include:

Mus 3340—Jazz Ensemble

or Mus 3390—Jazz Singers (4 cr)

Mus 3350—Jazz Combo

and/or Mus 3390—Jazz Singers (2 cr)

Mus 3410—University Wind Bands

or Mus 3230—Chorus

or Mus 3420—Orchestra (2 cr each)

See departmental guidelines for ensemble requirements.

Jazz Studies (21 cr)

Mus 3331, 3332—Jazz Improvisation I-II

Mus 3351, 3352—Jazz Piano Class I-II

Mus 5336—Jazz Arranging

Mus 5341—Jazz Pedagogy

Mus 5342—Jazz Theory

Afro 3108—Black Music: A History of Jazz

Afro 3301—Music of Black Americans

Recital

A senior recital is required: Mus 0951—Senior Recital.

B.M. in Music Performance

The B.M. program is for students who wish to complete professional studies in performance.

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

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

A senior recital is required for all programs in the Performance B.M. (Mus 0951—Senior Recital).

Minor Requirements

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

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 at the 1xxx level. At least three courses must be at the 4xxx level 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.

Minor Requirements

Students must complete at least 14 credits in philosophy courses at the 3xxx level 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 39 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, 2303 or Phys 1401, 1402, 2403
Phys 2201—Introductory Thermal and Statistical Physics
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.

Minor Requirements

The minor in physics requires 24 credits in physics and 12 credits in math, distributed as follows:

Math 1271, 1272, 2243 or Math 1371, 1372, 2373
Phys 1301, 1302, 2303 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.

This program concentrates on understanding the functions of the human body from individual cells to organ systems. It requires applying principles from a variety of physical and biological sciences.

This major is particularly appropriate for students who intend to enter medical school or graduate school and study any of a variety of biological or biomedical sciences. Required courses form a strong core in biomedical science. Students may tailor the overall degree program to specific needs. Some students may choose additional science courses in preparation for medical school or graduate school or take advantage of the freedom to pursue a more diverse undergraduate experience. 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 physiology for majors, organic chemistry with laboratory, introductory biochemistry, genetics, and cell biology. In addition, two upper level 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 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 with lab
 Chem 2302—Organic Chemistry II with 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.

Minor Requirements

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 the 1xxx level 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 Neuroscience Graduate Program, and affiliated research units within the department, such as the Center for Cognitive Science, 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.

Preparatory Coursework—Psy 1001—Introductory Psychology.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 36 credits in the major.

Degree requirements include Psy 1001—Introduction to Psychology (or its equivalent) and Psy 3005—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 3902—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 3005—Introduction to Research Methods and Statistics

Two courses from Group A—cognitive and biological area: Psy 3011, 3031, 3051, 3061 or 5061, 4011, 4036, 5012, 5013, 5014, 5015, 5031, 5034, 5036, 5037, 5038, 5051, 5054, 5062.

Two courses from Group B—clinical, personality and social areas: Psy 3101 or 5101, 3201, 3301, 3604 or 5604, 3617, 3666, 5202, 5204, 5205, 5206, 5207, 5606, CPsy 3301, CPsy 4303.

One course from Group C—individual differences, quantitative and applied areas: Psy 3135 or 5135, 3137 and 5137, 3711, 4501, 4801, 5121, 5136, 5138, 5501, 5701, 5702, 5703, 5705, 5862, 5865.

Electives from 3xxx, 4xxx, and 5xxx level psychology courses to satisfy the total minimum credit requirement (36 credits). A total of two courses from Psy 3960/5960, 3993, 3994 and 3996 may be used.

Psy 3902—Major Project

Minor Requirements

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 3005 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 or 5137, 3604 or 5604, 3666, 5136, 5206, 5606.

Social Science Track

Three courses from Group B and one course from: Psy 3135 or 5135, 3711, 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

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.

Minor Requirements

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 and Asian and Slavic Languages and Literatures

B.A.

The Slavic and Central Asian Languages and Literatures unit offers study of the Russian, Polish, and Iranian 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, Russ 3001-3002—Intermediate Russian 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—Third-Year Russian

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

Minor Requirements

Preparatory courses: Russ 1101, 1102, 3001, 3002

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.

Note: In fall 2000, the Institute plans to make available a new major in global studies. At that time, students will no longer be able to declare a major in Russian area studies. Students who have already declared this major will be allowed to complete it or to change to the global studies major. For more information, contact the Global Studies adviser, 232A Social Sciences Building (612-624-9353).

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

Students must complete 3011 and 3012 courses in one of the following four languages: Danish, Finnish, Norwegian, or Swedish (Dan, Fin, Nor, Swed 3011 and 3012, totaling 8 credits)

Scan 3501—Scandinavian Culture Past and Present

Scan 3504—The Immigrant Experience

Scan 4001—Scandinavian Languages for Reading

GSD 3451—Major Project in German and Scandinavian

12 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.

Language Requirements

Students must complete 3011 and 3012 courses in one of the following four languages: Danish, Finnish, Norwegian, or Swedish (Dan, Fin, Nor, Swed 3011 and 3012, totaling 8 credits).

Final Project

All majors must complete GSD 3451—Major Project in German and Scandinavian.

Six out of twelve of the University's highest ranking programs—ranked by the National Research Council—are in CLA.

Minor Requirements

Students pursuing a minor must complete at least 14 credits. Students must complete 3011 and 3012 in one of the following four languages: Danish, Finnish, Norwegian, or Swedish (Dan, Fin, Nor, Swed 3011 and 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 the 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 are encouraged to complete an introductory sociology course (Soc 1001 or 1011 or the equivalent from a transfer college) before officially declaring the major.

Required Courses

Prerequisite to all 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 9-12 credits (three to four courses) at the 3xxx, 4xxx, or 5xxx level and 3-6 credits (one to two courses) of 4xxx courses

Sociology: Law, Criminology, and Deviance (LCD)

Soc 3111—Introduction to Crime and Criminal Justice

Soc 3701—Social Theory (3 cr)

Soc 3811—Basic Social Statistics (4 cr)

Soc 3801—Sociological Research Methods (4 cr)

At least 12 elective credits (four courses), including 3-6 credits (one to two courses) of general sociology courses at the 3xxx or 4xxx level and 6-9 credits (two to three courses) of LCD courses at the 4xxx level

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.

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.

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 are encouraged to complete 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 strongly 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 courses focusing on technical and quantitative aspects of social research.

The supportive field courses consist of four additional courses (12-16 cr) at the 3xxx or 4xxx level, from departments of computer science, economics, mathematics; philosophy, psychology, educational psychology, and statistics. The courses on this list are available from the Department of Sociology.

Required Courses

See “Required Courses” in Sociology B.A.

Final Project

See “Final Project” in Sociology B.A.

Minor Requirements

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)

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 4xxx 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 (if statistics has been completed in another department) Soc 3801—Sociological Research Methods (4 cr)
 One additional 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.

Note: In fall 2000, the Institute plans to make available a new major in global studies. At that time, students will no longer be able to declare a major in South Asian and Mideast area studies. Students who have already declared this major will be allowed to complete it or to change to the global studies major. For more information, contact the Global Studies adviser, 232A Social Sciences Building (612-624-9353).

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.

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.

Minor Requirements

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.

For information
 about study abroad
 programs, contact
 the Global Campus,
 230 Heller Hall,
 612-626-9000.

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.

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 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 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 Requirements

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.

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.

*College of
Liberal Arts*



The National
Research Council
ranks the statistics
program as one of
the top 15 in the
nation.

The Department of
Theatre Arts and
Dance has
presented theatre
productions for
more than 120
years.

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.

Minor Requirements

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.

Speech-Communication

Department of Speech-Communication

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 speech-communication adviser in 278 Ford Hall to declare a premajor. Students are strongly encouraged to declare their pre-speech major during their first or second year.

A pre-speech major must complete the following three courses to be admitted into the major:

- Spch 1101—Introduction to Public Speaking
- Spch 1102—Introduction to Communication
- Spch 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 Spch 3211, 3401, 3601, and 3 credits from Spch 3201, 3411, 3422, 3605, 3990, 4452

Communication and Social Interaction Cluster

Spch 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

Spch 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 speech-communication undergraduate advisers.

Minor Requirements

Spch 1102—Introduction to Communication

Spch 1101—Introduction to Public Speaking

or Spch 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: Spch 3211, 3401, or 3601.

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.

Minor Requirements

Students must complete at least 14 credits from 3xxx, 4xxx, and 5xxx School of Statistics courses, including at least two courses at the 5xxx level.

Theatre Arts

Department of Theatre Arts and Dance

B.A.

The theatre arts 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 44 credits in the major.

This requirement includes 7 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—Introduction to Theatre

Th 1321—Beginning Acting

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 Neoclassicism

Th 3172—History of the Theatre: Romanticism to the Present

Th 3711—Beginning Directing

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.

Minor Requirements

The theatre arts minor consists of the following courses, for a total of 23 credits:

Th 1101—Introduction to Theatre

Th 1321—Beginning Acting

Th 3513—Design and Technical Production I

Th 3515—Design and Technical Production II

Th 3711—Beginning Directing

Any two of the following: Th 3171, 3172, 4177, or 4178

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 coursework focusing on urban form and society, with additional credits from areas such as cultural analysis, and political economy and infrastructure. An internship and a senior paper are also required.

Students must complete the following courses within the program: an introductory course, two urban studies colloquia, and two workshops. 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>>.

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

UrbS 3201—Urban Studies Colloquium

UrbS 3202—Urban Studies Colloquium

Two sessions of UrbS 3500—Urban Studies Workshop (6 cr total)

UrbS 3900—Urban Studies Internship Seminar

UrbS 3955—Senior Paper Seminar

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).

Electives—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.

Minor Requirements

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

UrbS 3201—Urban Studies Colloquium
 UrbS 3202—Urban Studies Colloquium
 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).

B.S.

Degree Requirements

Students must complete at least 120 credits to graduate, including at least 42 credits in the major.

The program requires coursework focusing on urban form and society, plus credits from areas such as cultural analysis, and political economy and infrastructure. An internship and a senior paper are also required. The B.S. requires substantive quantitative skills coursework.

Students must complete certain courses within the program: an introductory course, two urban studies colloquia, and two workshops. The *Urban Studies Program Booklet*, available from the department, lists the required and recommended courses, and course offerings in other academic departments that can fulfill urban studies requirements.

Required Courses

UrbS 1001—Introduction to Urban Studies: The Complexities of Metropolitan Life
 or UrbS 3001—Introduction to Urban Studies: The Complexities of Metropolitan Life

UrbS 3201—Urban Studies Colloquium
 UrbS 3202—Urban Studies Colloquium
 Two sessions of UrbS 3500—Urban Studies Workshop (6 cr total)
 UrbS 3900—Urban Studies Internship Seminar
 UrbS 3955—Senior Paper Seminar

Four courses totaling at least 12 credits of skills or methods courses identified in the *Urban Studies Program Booklet*

Courses from several departments are identified; students choose five of these courses in identified tracks (at least 15 cr total)

Electives—See the *Urban Studies Program Booklet* for a complete listing of courses that may be applied or <<http://urbanstudies.cla.umn.edu>>.

Final Project

Students must complete UrbS 3955—Senior Paper Seminar.

Minor Requirements

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

UrbS 3201—Urban Studies Colloquium
 UrbS 3202—Urban Studies Colloquium
 Two sessions of UrbS 3500—Urban Studies Workshop (6 cr total)
 Two courses from one of the tracks (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 Afro-American and African Studies; American Studies; American Indian Studies; Chicano Studies; Comparative Studies in Discourse and Society; English; German, Scandinavian, and Dutch; History; Philosophy; Sociology; Spanish and Portuguese; and Speech-Communication. 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 (4 cr)
 or WoSt 1002—Introduction to Gender Studies (4 cr)

One of the following 3-credit courses: WoSt 1003, 3001, 3002, 3003, 3004

WoSt 3102—Feminist Thought and Theory (3 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)

WoSt 4993—Directed Study (1 cr) under the supervision of the student's senior project faculty adviser, and concurrent registration in WoSt 4108—Senior Writing Seminar (2 cr); or WoSt 4109 for internship-based senior projects.

Women's studies majors must complete two junior-senior seminars or one junior-senior seminar and WoSt 4109—Field Learning (internship). 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.

Minor Requirements

The women's studies minor requires 18 credits.

WoSt 1001—Introduction to Women's Studies (4 cr)
 or WoSt 1002—Introduction to Gender Studies (4 cr)

Five upper level courses. No more than one of the following courses may be used to fulfill this requirement: WoSt 3001, 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 2000-2002 University of Minnesota Undergraduate Catalog.

CSOM

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**Carlson School
of Management**



Carlson School of Management

General Information

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.

History

- Founded in 1919
- Named the Curtis L. Carlson School of Management in 1986

Faculty and Staff

- 112 faculty, including 24 endowed faculty
- 150 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*, 1999
 - Evening M.B.A. program ranked 9th in country by *U.S. News & World Report*, 1995
 - M.B.A. program ranked 23rd by its peers and 27th overall in *U.S. News & World Report*, 1997
 - Included in *Business Week's* list of top 40 M.B.A. business schools, 1994-1997
 - 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 undergraduate program ranked 3rd in country, *U.S. News & World Report*, 1999
 - MIS area ranked 1st in country by *U.S. News & World Report*, 1995 and 1998
 - Ranked 4th best "Techno-M.B.A. Program" in country, *Computerworld*, 1997
 - 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.)

1998-1999 Enrollments

- 1,650 undergraduates (1,450 day; 200 evening)
- 250 M.B.A. day students
- 1,150 M.B.A. evening students
- 54 M.H.A. day students
- 90 C.E.M.B.A. students
- 125 M.A.H.R.I.R. day students
- 120 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

1998-1999 Placement Statistics

Average salaries of new graduates:

- B.S.B.-general—\$37,766
- B.S.B.-accounting—\$35,894
- M.B.A.—\$68,395
- M.A.H.R.I.R.—\$51,800

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

Cosponsored International Programs

- M.B.A., H.R.I.R., and M.H.A. student exchange programs in Australia, Austria, Belgium, Brazil, Costa Rica, England, France, Italy, Japan, New Zealand, Spain, Sweden, and Switzerland
- Graduate summer business program with Université Jean Moulin-Lyon III in France
- Joint executive M.B.A. degree program with Warsaw School of Economics, Poland
- Joint executive M.B.A. degree program with Wirtschaftsuniversität Wien, Austria
- Undergraduate study abroad in Austria, Denmark, France, Germany, Spain, England, and Japan. (Other study abroad opportunities also available)
- Undergraduate exchange program with University of Maastricht Business School, The Netherlands, and Université Jean Moulin Lyon III, France.
- Faculty exchange programs in China, France, Japan, Austria, and Poland

Accreditation

American Assembly of Collegiate Schools of Business

Research Centers

Accounting
Entrepreneurial studies
Financial studies
Industrial relations
Logistics management
Marketing
MIS
Operations management
Quality management
Strategic management

Carlson School
of Management

Admission

Each year Carlson admits approximately 300 freshmen, 60 sophomores, and 60 juniors. For sophomores and juniors, college GPA, essays, and activities and achievements are key admission criteria.

Freshmen and sophomores admitted to Carlson must meet with advisers each semester, are expected to complete the first 60 credits within two years, and should maintain a minimum 3.00 GPA in order to pursue upper division majors.

Freshman Admission

Admission to the Carlson School is competitive and is based upon both academic performance (i.e. high school class rank and ACT/SAT scores) and overall records of accomplishment. Particular attention is given to students whose background includes significant levels of co- and extra-curricular activities. Students should refer to the most current University of Minnesota application form for additional information on Carlson School admission criteria.

Preference is given to students who submit completed applications, including all test scores, and transcripts, with a \$25 application fee by the December 15 priority deadline. Applications are available at <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).

The following profile of the class of fall 1999 is intended to help students assess their qualifications for Carlson freshmen admission.

1. Average high school rank 90th percentile
2. Average ACT score 26.4
3. Average AAR score 142.8
 - Top quarter of entering class: 145 or higher
 - Top half of entering class: 140 or higher
 - Top three-fourths of entering class: 135 or higher

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)

Admission at the Sophomore Year or Later

Standards for Admission to Carlson as Sophomores (from within the University)

A limited number of sophomores are admitted each fall. For the current application deadline, contact the Carlson Undergraduate Program Office.

For non-Carlson University freshmen to transfer to CSOM for their sophomore year, the following standards apply.

- Completion of 30–49 credits (students with 50 or more credits, see Admission to Upper Division in the next column)
- Completion of microeconomics, macroeconomics, and calculus
- Completion of other CSOM premajor requirements (contact an adviser in 1-105 Carlson School of Management for more information)
- All applicants with a 3.00 minimum overall GPA are considered. Admission is competitive and the GPA requirement is dependent upon the strength of the applicant pool and number of seats available. Students may submit an activity résumé to support their application.

If currently enrolled in another unit of the University, students should obtain a *Change of College or Status* form and *CSOM Application Addendum* at the Office of the Registrar, 200 Fraser Hall, or 130 West Bank Skyway (612-625-5333).

Admission to Upper Division Carlson Major Programs

The following standards apply for students transferring directly into a CSOM upper division major program.

- Completion of 50 or more semester credits
- Completion of calculus, microeconomics, macroeconomics, business statistics (OMS 1550—Business Statistics: Data Sources, Presentation, and Analysis or equivalent), accounting principles (Acct 2050—Introduction to Financial Reporting or equivalent) (for students applying to transfer directly into the upper division program, high grades in the courses listed above are particularly important)
- Admission GPA is subject to change depending on seats available and the strength of the applicant pool. Applicants with a 3.00 minimum overall GPA are considered. Students may submit an activity résumé to support their application.

If transferring from outside the University, students should obtain an admission application and a *CSOM 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 \$25 application fee must accompany the application.

How Credits Transfer to Carlson

Transferable credits completed at another institution may be used to meet admission requirements. Lower division business courses are accepted for transfer only if such coursework is available for credit in the College of Liberal Arts premanagement program.

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. 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 CSOM.

Foreign Credits

If students earned credits at a recognized educational institution abroad, the credits may transfer to CSOM 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. If students studied at an "unrecognized" foreign institution, they may earn credit only through special examinations authorized by the Undergraduate Studies Office.

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.

Other Admission and Registration Options

College of Continuing Education

Admission and program requirements for Carlson's evening program are identical to those for its day school program. Students must formally apply for admission to CSOM if they plan to earn a bachelor's degree in business. Students should plan to complete the premanagement requirements early in their program and apply to the school after earning approximately 50 to 60 semester credits.

Carlson offers an extensive selection of undergraduate courses in the evening and students can complete the required coursework for many CSOM programs through the College of Continuing Education (CCE). Careful planning is essential, however, because some courses are offered only once per year.

CSOM's evening program offers many of the benefits enjoyed by Carlson School day students and evening students are welcome to participate in CSOM events as their schedule allows. Like Carlson full-time students, evening students may take advantage of the advising services in both the Undergraduate Studies Office, 1-105 Carlson School of Management, and the Business Career Center, 1-110 Carlson School of Management.

CCE offers a number of certificate programs in various business fields. These programs are described in the College of Continuing Education catalog.

Distance Education

University of Minnesota distance education courses carrying degree credit may apply toward CSOM requirements. Carlson accepts a maximum of 12 credits of upper division CSOM courses completed through distance education toward the B.S.B. degree. There is no limit to the number of non-CSOM courses students can take through distance education.

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. These students are allowed to register for two semesters (this does not include summer sessions). They need written approval from the Undergraduate Studies Office for each semester's registration.

If students are admitted as non-degree seeking students and later decide to become degree candidates, they 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. The application deadline for non-degree seeking students is June 15 for fall semester.

Degrees

Baccalaureate Programs

A Carlson degree combines management and liberal arts coursework to provide students with strong communication, analytical, and creative problem-solving skills. CSOM 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, and a self-designed general management major.

Because of the globalization of the U.S. economy, the school encourages all students 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* as well as 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).

Find it

Find contact

information for the

Carlson School of

Management on

page 203.

**Carlson School
of Management**



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 week-long 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, 2-210 Carlson School of Management, 321 19th Avenue 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, 3-110 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 4-106 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.

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 (612-624-5810).

Minors

An IT management minor is available to qualified students in the Institute of Technology. A general management minor is also available to students admitted to other University of Minnesota, Twin Cities colleges. Minors in actuarial science, entrepreneurial studies, finance, human resources and industrial relations, risk management and insurance, and international business are available to Carlson students. See Degree Programs in this section.

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
- For a CSOM sophomore to matriculate to upper division and declare a major, the following standards apply.
 - Completion of 50 or more credits
 - Completion of calculus, microeconomics, macroeconomics, business statistics (OMS 1550—Business Statistics: Data Sources, Presentation, and Analysis), accounting principles (Acct 2050—Introduction to Financial Reporting), introduction to business and business careers (Mgmt 2350—Introduction to Business and Business Careers), and management fundamentals (Mgmt 3001—Fundamentals of Management), all with a minimum grade of C-
 - 3.00 overall GPA

CSOM sophomores may declare their major any time after the above criteria have been met.

Grading Options

Carlson students must earn a minimum of 90 A-F credits.

Alternative Registrations

V Registration (auditing)—V registration requests for CSOM courses are considered the first day following the day school alphabetical registration queue each semester.

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.

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.

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.

Carlson 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.

Graduation Requirements

To graduate from Carlson students must

- complete the University of Minnesota liberal education requirements.
- complete a minimum of 120 credits. These credits include the required premanagement coursework and the specific upper division requirements listed below.
- 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 courses at the University of Minnesota.
- be in good academic standing with a minimum GPA of 2.00 in all work taken after admission to CSOM and in all upper division courses offered by CSOM departments. (See page 198 for lower division progress standards.)

Students planning to leave school for a semester or more 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.

Students admitted to an upper division major before fall 1999 should consult the appropriate *CSOM Bulletin* for their program requirements.

To declare a major or a minor, students must complete the *CSOM Major/Minor Declaration* form available in the Undergraduate Studies Office, 1-105 Carlson School of Management.

Advising

CSOM offers centralized advising services to undergraduates currently enrolled or interested in its programs.

To schedule an appointment with a Carlson academic adviser, students should call 612-624-3313 or visit 1-105 Carlson School of Management. The CSOM adviser will help design and implement a program of study and extracurricular activities 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.

Carlson freshmen have access to individual and group advising sessions led by professional Undergraduate Studies Office advisers in 1-105 Carlson School of Management. Freshman-year sessions assist students in adapting to college life and becoming part of the Carlson School learning community. Upper division CSOM students are available to serve as “Carlson Buddies” to help freshmen learn the ropes.

Special Learning Opportunities and Resources

Honors Association 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. The association 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 also is open to all admitted freshmen with ACT composite scores of 28 or higher and high school class ranks in the 90th percentile and above. Other students should contact an Undergraduate Studies Office adviser (1-105 Carlson School of Management) for information about applying to the program.

Mentorship Program—Carlson students may request a mentor from the Twin Cities business community. This is an ideal way to learn more about the business world and begin developing business connections. Mentors can also help students develop their résumé, improve their interviewing skills, and expand their knowledge of business practices. See an Undergraduate Studies Office adviser for more information.

Accounting Internships—Two optional internship opportunities are available in the accounting program.

Acct 3199—Internship in Public Accounting

Acct 3299—Internship in Management Accounting

The accounting internships require full-time work and provide an opportunity to apply accounting concepts and methods and gain experience that can help in making career decisions. The public accounting internship emphasizes auditing and taxation. The management accounting internship involves 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 (1-150 Carlson School of Management, 612-625-8005)—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 (295 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

With the internationalization of the economy, it is more important than ever to gain an understanding of other cultures, languages, and business practices.

An Undergraduate Studies Office adviser, 1-105 Carlson School of Management, specializes in advising business majors considering a study abroad program or international business major and can provide current information on scholarship funds to support study abroad.

For more information, see “Study Abroad” in the General Information section of this catalog.

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, get help writing résumés, obtain information about companies throughout the United States, and polish interpersonal skills through mock interviews. The center is the place to start searching for an internship, part-time job, or full-time position. Students will find hundreds of listings for companies with positions to fill and many opportunities to interview on campus with recruiters eager to hire Carlson School graduates.

Student Organizations

Actuarial Club—This club is made up of students and staff of 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 is made up of accounting majors with GPAs of at least 3.20 in accounting and 3.00 overall. Beta Alpha Psi introduces the aspiring accountant to the business world by encouraging interaction among students, faculty, alumni, and area business people. It sponsors speakers from all areas of accounting and members tour CPA firms, industry, and government offices. The group provides tutors for students in accounting, participates in a Volunteer Income Tax Assistance program, and sponsors recreational sports teams.

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.

The Carlson School's
undergraduate
programs rank
#14 in the nation
according to U.S.
News & World
Report.

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. Nonboard members are welcome to participate in all B-Board meetings and events.

Club MIS—This club is for students interested in using computers in business. Members learn about career opportunities in computer-related fields by meeting with practicing professionals.

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.

Honors Association Emerging Leadership Program—See Special Learning Opportunities and Resources.

Investment Club—This club provides information about financial markets and discusses alternative vehicles for investment. Some of the topics include common stocks, bonds, mutual funds, options and futures/commodities trading, ethical investing, and financial planning.

GLOBE—GLOBE provides a means for Carlson students, faculty, and staff interested in international business to learn about the topic through monthly speakers and other events.

Phi Beta Lambda—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 management and premanagement 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 large 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. This organization contributes to the community, including an annual Fall Clean-Up and helping the Minnesota Accounting Aid Society provide tax services to people meeting their requirements. An interest in accounting is the only membership requirement.

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

3-110 Carlson School of Management
624-6506

Business Career Center

1-110 Carlson School of Management
624-0011

Carlson Executive M.B.A. Program

2-210 Carlson School of Management
624-1385

Executive Development Center

2-250 Carlson School of Management
624-2545

Finance

3-110 Carlson School of Management
624-2888

Human Resources and Industrial Relations

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

3-353 Carlson School of Management
624-8030

Management and Information Systems Research Center

624-6565

Juran Center for Leadership in Quality

4-106 Carlson School of Management
624-6565

Managerial Communication Skills Center

1-150S Carlson School of Management
624-1525

Marketing and Logistics Management

3-150 Carlson School of Management
624-5055

Entrepreneurial Studies Center

624-3838

M.B.A. Program

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

Alumni Relations

625-1556

Communications

625-0843

Corporate Relations

625-9538

Financial Services

625-0086

International Program Development

4-104 Carlson School of Management
625-9361

Office of Information Technology

L-119 Carlson School of Management
625-5550

Physical Resources

624-3842/626-9378

Operations and Management Sciences

3-150 Carlson School of Management
624-7010

Ph.D. Program

4-106 Carlson School of Management
624-0875

Strategic Management and Organization

3-353 Carlson School of Management
624-5232

Strategic Management Research Center

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

World Wide Web: <www.csom.umn.edu>

**Carlson School
of Management**

Carlson School of Management

Degree Programs

All Programs

The following requirements apply to all Carlson degree programs.

Lower Division Requirements

Students Beginning as Freshmen

Tool Courses: Management-Related and Mathematics (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)
Introduction to business and business careers (Mgmt 2350) (4 cr, A-F only)
University of Minnesota liberal education requirements

Students Beginning as Sophomores

Tool Courses: Management-Related and Mathematics (A-F only)

Microeconomics (Econ 1101) (4 cr)*
Macroeconomics (Econ 1102) (4 cr)*
Calculus (Math 1142 [3 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)
Introduction to business and business careers (Mgmt 2350) (4 cr, A-F only)
University of Minnesota liberal education requirements
** Must be completed before the student's first semester in CSOM. See sophomore admission requirements earlier in this section.*

Upper Division Requirements

- A. Functional core (2 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. Mgmt 4004—Business Policy: Strategy Formulation and Implementation (4 cr, A-F only)
- C. International core (4 cr, A-F only)
- BGS 3040—International Environment of Business
- D. Communications core (4 cr, A-F only)
- BA 3033—Business Communication

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—Asset Valuation and Income Determination (4 cr)
Acct 5102—Liability Valuation and Income Determination (4 cr)
Acct 5125—Auditing Principles and Procedures (4 cr)
Acct 5135—Fundamentals of Federal Income Tax (4 cr)
BLaw 3058—The Law of Contracts and Agency (4 cr)
- Four credits from the following:*
- Acct 3201—Intermediate Management Accounting (2 cr)
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 Ethics (2 cr)
Acct 5310—International Accounting (2 cr)
Acct 5320—Current Topics in Accounting (2 cr)

Actuarial Science

Industrial Relations Center

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.

During the 1998-99 school year, 108 companies came to the CSOM Career Services Center to interview students. The average starting salary of B.S.B. graduates is about \$37,766.

Required Courses

Two years of college calculus

Four credits from Ins 5101, Ins 5200, Ins 5100 or Ins 5201

(students may take all four courses for greater exposure to the insurance industry aspect of the major; if they take only two courses, Ins 5100 and 5200 are preferred) (4 cr total)

Math 4065 (3 cr)

Math 5067 and 5068 (4 cr ea)

Stat 5101 and 5102 (preferred sequence)

or Stat 4101 and 4102 (this sequence acceptable only if students also complete a probability course)

Minor Requirements

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)

Math 4065—Theory of Interest (3 cr)

or Math 5067—Actuarial Mathematics I (4 cr)

or Math 5068—Actuarial Mathematics II (4 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:

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)

Minor Requirements

Fina 4241—Corporate Financial 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 self-designed and varies for each student. A minimum of four upper division courses (at least 16 credits) beyond the core courses is required.

**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 is intended to provide current and future business professionals with the necessary skills and tools to successfully form and develop businesses. Students will learn

- personal time, work, and life management skills.
- business leadership skills.
- management skills.
- to apply traditional core functional business knowledge to the entrepreneurial enterprise.
- skills for coping with a rapidly changing environment.
- communication and negotiation skills.
- to manage ambiguity—to assess risk and make sound business decisions within an unstructured environment.
- to construct an effective business plan.

Required Courses

Acct 5100—Corporate Financial Reporting (4 cr)

Mgmt 4008—Entrepreneurial Management (4 cr)

Mgmt 5177—The Business Plan (2 cr)

Ten credits from the following electives:

BGS 3002—Business and Society: The U.S. and World Economy (4 cr)

Fina 4241—Corporate Financing Decisions

or Fina 4242—Corporate Investment Decisions

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

Mktg 3010—Marketing Research

or Mktg 4050—Integrated Marketing Communications (4 cr)

OMS 3041—Project Management (2 cr)

A final major project is also required.

Find it

Find the Carlson
School of
Management on the
Web at

<www.csom.umn.edu>.

**Carlson School
of Management**



Minor Requirements

12 semester credits
 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.

Human Resources and Industrial Relations

Industrial Relations Center

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. This breadth of exposure will prepare students to step into the array of support positions in human resource management that have been identified as growing rapidly over the next decade and beyond.

Students electing to minor in HRIR will find the minor complements their field of specialization, enabling them to understand the human resource side of individual areas in business. The minor focuses attention on the identification and selection of individuals for specific operating functions of a business in order to promote the optimum human resource contribution.

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 5061—Labor Policy (3 cr)

Ins 5101—Employee Benefits: Public Policy and Practice (2 cr)

Minor Requirements

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 or Acct 5310
 Mktg 4070 or BGS 3004
 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.
 A study abroad of any length is required for the minor, including 4 semester credits of business-related coursework.
 Sufficient credits in international business (or related area) for a minimum credit total of 20 semester credits for a major, 12 semester credits for a minor.

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. Fourteen 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 6 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.

The management information systems area was ranked #3 in the nation by *U.S. News & World Report*.



Required Courses

IDSc 3201—Information Systems Application Development (4 cr)
 IDSc 3202—Analytical Skills for Business Application Development (4 cr)
 IDSc 4203—Information Technology Infrastructure (4 cr)
 IDSc 4204—Information Services Management (2 cr)

Six 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 4451—Telecommunications Fundamentals and Applications (2 cr)
 IDSc 4452—Data Communications and Networks (2 cr)
 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.

Degree Requirements

The marketing major provides a coherent yet broad-based study leading to job market and professional opportunities. To provide enough depth, marketing majors must take 20 credits beyond the required introductory course (Mktg 3001). One course, Mktg 3010—Marketing Research, is required. Students select the remaining 16 credits from the list below. Students may choose appropriate courses for their career goals.

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)

Risk Management and Insurance

*Industrial Relations Center***B.S.B.**

Risk management identifies, assesses, and addresses the causes and effects of risk on an organization, including risks of loss to human resources and assets, legal liability to others, applying risk control, risk transfer, and risk financing techniques. Insurance is one of the major transfer tools of risk management. The risk management and insurance major applies theory to practice using principles of finance, law, and mathematics in the transfer and reduction of risk for individuals, corporations, and government.

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)

Minor Requirements

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)

Additional Minors

IT Management Minor

This management minor is open to Institute of Technology students.

Prerequisites

Econ 1104 and 1105
 or Econ 1101 and 1102

An overall GPA of at least 2.80

Admitted to an upper division IT major with at least 60 semester credits completed

Required Courses

Acct 2050—Principles of Accounting (4 cr)
 Acct 3001—Introduction to Management Accounting (2 cr)
 Fina 3001—Finance Fundamentals (2 cr)
 Mgmt 3001—Fundamentals of Management (2 cr)
 Mktg 3001—Principles of Marketing (2 cr)
 OMS 3001—Introduction to Operations Management (2 cr)
 Stat 3021—Introduction to Probability and Statistics (or equiv) (3 cr)
 4 credits of upper division CSOM electives

General Management Minor

A general management minor is open to students enrolled in other colleges at the University.

Prerequisites

50 semester credits
 3.00 overall GPA
 Must have declared upper division major
 Acct 2050, Econ 1101, OMS 1550, and Math 1031 or the equivalent

Required Courses

Fina 3111—Fundamentals of Finance (2 cr)
 HRIR 3121—Human Resource Management (2 cr)
 IDSc 3111—Information Systems Management (2 cr)
 Mgmt 3111—Principles of Management (2 cr)
 Mktg 3111—Principles of Marketing (2 cr)
 OMS 3111—Operations Management (2 cr)

Medical Technology

This is the Medical Technology section
of the 2000-2002 University of
Minnesota Undergraduate Catalog.

Medical Technology

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Program in Medical Technology

General Information

Initiated in 1922, the medical technology program was the first in the nation to offer a baccalaureate degree.

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 NAACLSINFO@naacils.org).

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 Health East Hospitals (St. Paul).

Admission

The Division of Medical Technology sets its own standards and requirements for admission. These require 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 in the College of Liberal Arts (CLA) 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 in the preprofessional program must meet the admission criteria and are subject to CLA's academic regulations or their equivalent at another institution. For complete information, see the CLA section of this catalog.

Qualified applicants may enter CLA at the beginning of any semester, but 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 does not assure admission to the professional program.

It is recommended that prospective students take mathematics, physics, chemistry, and biology in high school.

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 or Status* form with the Office of the Registrar, 200 Fraser Hall, by February 1. 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). You may wish to refer to the

admissions Web site for other information <<http://admissions.tc.umn.edu>>. 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, Box 609 Mayo, 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, 320 16th Avenue S.E., 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 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, Box 609 Mayo, 420 Delaware Street S.E., Minneapolis, MN 55455-0374 (612-625-8952).

Policies

Immunizations—All students in the medical technology program are expected to arrange appointments at Boynton Health Service for necessary immunizations (including one for hepatitis) before assignment to the clinical courses of the professional program. This procedure is required to protect students.

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.

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.



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

Medical Technology

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 pre-health 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 has five scholarship programs for students in the professional program. Approximately 30 awards are made annually. 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 213 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, Box 609 Mayo, 420 Delaware Street S.E., Minneapolis, MN 55455-0374. Offices at 15-170 Phillips-Wangensteen Building (612-625-9490; e-mail medtech@tc.umn.edu).

The medical technology program holds the only endowed professorship in medical technology in the United States.

Program in 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/requirements.html>. 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—New freshmen need to complete 1-2 first-year courses, depending on their college of enrollment, and four writing intensive courses (total). Two of the writing intensive courses must be taken at the upper division level, one of which should be taken in the student's major. See the writing intensive Web site at <www.opa.pres.umn.edu/students/wiprop.htm>. Transfer students should complete the upper division writing requirement for their major. If you have questions about the requirement or which requirement you should complete see your academic adviser. In the future, the Division of Medical Technology plans to provide two writing intensive courses as part of their required courses in the professional program (year 4).

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 GCB 3022—Genetics
BioC 3021—Biochemistry
BioC 4002—Biochemistry of Physiological Processes
EngC 3027—Advanced Expository Writing or equivalent
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 4102—Principles of Diagnostic Microbiology
MedT 4127—Introduction to Management and Education I
MedT 4128—Introduction to Management and Education II
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

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

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.

Find it



Student services information (e.g., admissions, financial aid, employment)—start with One Stop Student Services at <<http://onestop.umn.edu>>.

Medical
Technology

Mortuary Science

This is the Mortuary Science section of
the 2000-2002 University of
Minnesota Undergraduate Catalog.

Mortuary Science

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Mortuary Science

General Information

The Program of Mortuary Science is the only program in the world housed in a medical school at a major research institution.

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, Box 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 eligible to enroll in the Senior Option and complete degree requirements in 15 months.

Liberal Education Requirements

For University of Minnesota, Twin Cities campus liberal education requirements, see page 35 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 Status or College*, available from the Office of the Registrar on any campus. Application deadlines for internal transfer are July 1 for fall semester admission, November 15 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 usually last one day and 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" on page 220.

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

Faculty 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, see "Financial Aid" in the General Information section of this catalog. Students may obtain materials for mortuary science scholarships by contacting the Program of Mortuary Science, University of Minnesota, Box 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, Box 740, 420 Delaware Street S.E., Minneapolis, MN 55455 (phone 612-624-6464; fax 612-626-4163; e-mail mortsci@tc.umn.edu). Offices are located at A275 Mayo Memorial Building, 401 Church Street S.E.

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 49 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. A minimum of 10 credits must be in upper division electives outside the major.

All mortuary science majors seeking their first baccalaureate degree must meet the Program of Mortuary Science writing-intensive course requirements.

Required Courses

Phar 1002—Health Sciences Terminology (2 cr)

Junior Year

Fall Semester

Mort 3005—History of Funeral Service (2 cr)
Mort 3012—Organization and Management of Funeral Business (3 cr)
Mort 3025—Mortuary and Business Law (3 cr)
Electives (8-10 cr)

Spring Semester

PubH 3001—Personal and Community Health (2 cr)
Mort 3016—Funeral Service Marketing and Merchandising (3 cr)
Mort 3020—Funeral Psychology and Counseling (3 cr)
Electives (8-10)

Senior Year

Fall Semester

Mort 3014—Funeral Service Rules and Regulations (3 cr)
Mort 3051—Restorative Art (2 cr)
Mort 3055—Complicated Grief (3 cr)
Mort 3061—Embalming I (3 cr)
Mort 3151—Restorative Art Laboratory (1 cr)
Mort 3161—Embalming I Laboratory (1 cr)
Electives (3 cr)

Spring Semester

Mort 3018—Funeral Practice (3 cr)
Mort 3062—Embalming II (3 cr)
Mort 3162—Embalming II Laboratory (1 cr)
Mort 3370—Funeral Service Seminar (1 cr)
LaMP 3050—Pathology for Mortuary Science Students (3 cr)
Electives (4-6)

Summer Session

Mort 3380—Funeral Service Practicum (8 cr)

Electives—Mort 3091—Independent Study in Funeral Service (1-3 cr) can be applied toward the major.

Final Project

Students complete an off-campus practicum. This capstone experience is completed only after all other degree requirements have been met. The program places eligible candidates in affiliated funeral homes. Under supervision, students participate in all aspects of funeral service practice.



College of Natural Resources

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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—CNR is based in six buildings on the St. Paul campus and one building on the Minneapolis campus. The Natural Resources Administration Building, Green Hall, the Kaufert Laboratory of Forest Products and Wood Science, Hodson 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 Lab, and some Department of Fisheries and Wildlife 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 and Wildlife office; Entomology, Fisheries, and Wildlife Library; labs; lecture rooms; and faculty facilities are in Hodson Hall and the Engineering and Fisheries Laboratory. Adjacent to college facilities is the regional headquarters of the USDA U.S. Forest Service Research Forest Experiment Station.

CNR uses several field centers for its programs: The University's Lake Itasca Forestry and Biological Station is located in Itasca State Park in north central Minnesota. Fisheries and Wildlife, Forest Resources, Natural Resources and Environmental Studies, and Urban Forestry majors spend a three-week summer term at the station.

CNR's Cloquet Forestry Center includes more than 3,700 acres of virgin and second-growth forest in a major forest products manufacturing area of northeastern Minnesota. Forest resources students complete a five-week field forestry 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 four departments: fisheries and wildlife (200 Hodson Hall); forest resources (115 Green Hall); an interdisciplinary program called natural resources and environmental studies (135 Natural Resources Administration Building); and wood and paper science (203 Kaufert Laboratory).

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 CNR 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—High school graduates must submit scores from the Scholastic Aptitude Test (SAT) or American College Test (ACT) along with their high school rank percentile (HSR).

The formulas below show how to calculate the ACT or SAT "Aptitude Rating" using a student's high school rank percentile and ACT or SAT test scores. If the Aptitude Rating falls at or above the number indicated for the college that a student plans to enter, the student will be admitted automatically, provided the student also has completed the high school preparation requirements. If the Aptitude Rating falls below the number indicated, the application will be reviewed through the University's individual review process.

AAR (ACT Aptitude Rating, for students who have taken the ACT):

$$\text{HSR percentile} + (2 \times \text{ACT composite score}) = 110$$

SAR (SAT Aptitude Rating, for students who have taken the SAT):

$$\text{HSR percentile} + (\text{SAT verbal} \div 10 + \text{SAT math} \div 10) = 171$$

Note: The AAR and SAR scores shown above were for fall 2000 admission. Students should call the Office of Admissions (612-625-2008) for the latest admission criteria.

Students seeking admission will be expected to have completed the University's high school course preparation requirements. See "Freshman Admission" in the General Information section of this catalog.

Applicants who attain at least the minimum score and meet course requirements will be admitted routinely. Others will be considered on an individual basis, taking into account factors such as high school performance and educational objectives.

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. majors. CNR offers six major curricula:

- fisheries and wildlife (with specializations in fisheries, wildlife, and conservation biology);
- forest resources (with tracks in forest management and forest science);
- 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;
- urban 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, students may transfer between curricula at the end of their freshman 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, contact the appropriate director of graduate studies: 135 NRAB (612-624-6768) for forestry or wood and paper science, 200 Hodson Hall (612-624-3600) for fisheries and wildlife. Or consult the *Graduate School Catalog*. The CNR Web site at <www.cnr.umn.edu> also links to departments and graduate programs. Interested students should apply for admission through the Graduate School, 306 Johnston Hall, 101 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-3014).

Minors

CNR offers four 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, urban forestry, and paper science and engineering. 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 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 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—Completion of 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 the College of Liberal Arts honors program (HCol designated courses), other University honors programs, and transfer institutions.

Completion of at least two honors courses with a grade of B or better.

Completion of 60 semester credits with a cumulative GPA of at least 3.30.

Qualifications for Upper Division Applicants

A cumulative GPA of at least 3.30, with at least 60 semester credits completed (After admission, students must achieve a GPA of at least 3.50 in their last 60 semester credits.)

Application Procedure for Upper Division Applicants—Students must complete an upper division honors application and include 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. 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 campus.
- Two semesters (two 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 cr) of honors seminar according to 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. Information may be obtained from the CNR Student Services Office. 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.

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 may report the incident to the college Honor Case Commission, a committee of the Student-Faculty Board. 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 of D+ or lower is earned. The most recent passing grade and credits count in the GPA and credit totals. 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" under 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.
- 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 and public ethics. The environment and international perspectives themes may be satisfied by completing the required courses in each program. The remaining themes may be satisfied by careful selection among core professional and elective courses. See individual CNR degree programs for specific courses.

Find it

Visit the CNR

Student Services

Web site at

<www.cnr.umn.edu/ug/ugmain.html>.

College of
Natural Resources

Itasca Session—Forest resources, urban forestry, and fisheries and wildlife majors are required to complete a three-week summer field session at the Lake Itasca Forestry and Biological Station. To attend, students must have completed 30 semester credits and attained a cumulative GPA of at least 2.00. Forest resources and urban forestry students must also have completed the following courses with a grade of at least C-: Biol 1009 or Biol 1001, Chem 1011 or Chem 1021, and precalculus or college algebra. Fisheries and wildlife students must have completed the following courses with a grade of at least C-: Biol 1009, Biol 2022, Biol 2012, and Biol 3407. NRES students are required to complete either a field session at Itasca 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 Biol 1001, and FR 3104 or Biol 3407. The Itasca session is also open to students not enrolled in CNR.

Cloquet Session—Students in the forest resources major are required to complete the Cloquet Forestry Session in their senior year. To attend, students must attain a cumulative GPA of at least 2.00, complete the Itasca Session, FR 4218, FR 4262, FR 4411, and FR 4431 and other prerequisites. This is a four and one-half week session held in the spring during the intersession 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

Minnesota-Idaho Student Exchange—Forest resources students at the University may study forest harvesting in Idaho during their senior year under an exchange agreement with the University of Idaho. Minnesota students return from their study in Idaho to be awarded a B.S. from CNR.

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 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 intersession following spring semester.

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 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 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. In addition, CNR offers a 3 credit class over winter break, NRES 3206—The Natural History of Costa Rica.

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 seek credit in their major. Study abroad is encouraged 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 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 either the Career Opportunities Coordinator in 135 Natural Resources Administration Building or by department faculty. A series of special employment seminars are provided by the Career Services Office on topics such as resume writing, interviewing, initiating internship job searches, and summer/seasonal intern hiring updates. Each major also requires for incoming students an orientation class that provides interaction with faculty and alumni in their chosen professional field.

Student Organizations

Governance—Students may 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 CNR's 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. 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 and Wildlife Club (with an affiliated student chapter of The Wildlife Society), Minnesota Women in Natural Resources Student Organization, Xi Sigma Pi Honor Society, Water Resources Students in Action, and Student Society of Arboriculture.

Directory

(area code 612)

CNR Administration

Dean's Office

235 Natural Resources Administration Building
624-1234

Student Services

135 Natural Resources Administration Building
624-6768

Career Services

135 Natural Resources Administration Building
624-6768

Admissions/Prospective Student Services

135 Natural Resources Administration Building
624-6768

Departments

Fisheries and Wildlife

200 Hodson Hall
624-3600

Forest Resources

115 Green Hall
624-3400

Natural Resources and Environmental Studies

135 Natural Resources Administration Building
624-6768

Wood and Paper Science

207 Kaufert Lab
625-5200

Cloquet Forestry Center

Cloquet, MN 55720
218-879-0850

Find it



Visit the CNR Career Center for listings of summer jobs, internships, and permanent jobs in environmental and natural resources areas.

College of
Natural Resources

College of Natural Resources

Degree Programs

Fisheries and Wildlife

Department of Fisheries and Wildlife

B. S.

The fisheries and wildlife curriculum provides students with 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.

Required Courses

Communication Skills

- EngC 1013—University Writing and Critical Reading, Emphasis on Environment (4 cr)
or Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1223—Oral Presentations in Professional Settings (3 cr)
or Spch 1101—Introduction to Public Speaking (3 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)
and Math 1272—Calculus II (4 cr)
or Math 1131—Finite Mathematics (3 cr)
and Math 1142—Short Calculus (4 cr)
FW 4001—Biometry (4 cr)
or Stat 5021—Statistical Analysis (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)
GCB 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—Intro Biol I: Evolutionary and Ecological Perspectives (4 cr)
and Biol 1002—Intro Biol II: Molecular, Cellular, and Developmental Perspectives (5 cr)

Select one of the following groups:

- Phys 1101—Fundamental Physics I (4 cr)
and Phys 1102—Fundamental Physics II (4 cr)
or Phys 1001—The Physical World—Energy and Its Impact on the Environment (4 cr)
and Geo 1001—The Dynamic Earth: Introduction to Geology (4 cr)
or Geo 1019—Our Changing Planet (4 cr)
or Ast 1001—Exploring the Universe (4 cr)
or Geog 1425—The Atmosphere (3 cr)
and Geog 1426—The Atmosphere Lab (1 cr)
or Phys 1201—General Physics I (5 cr)
and Phys 1202—General Physics II (5 cr)

Social Sciences and Humanities

At least 15 credits, distributed as follows:

- Social Science—at least 6 credits, including at least one economics course
Historical Perspectives—one course, at least 3 credits (can also apply to a designated theme)
Humanities—at least 6 credits, with one course in literature and one course in "other humanities"

Core Courses

- Biol 3407—Ecology (3 cr)
FW 1001—Orientation in Fisheries, Wildlife, and Conservation Biology (1 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)
NRES 3011W—Ethics, Conflict and Leadership in Resource Management (3 cr)



Conservation Biology Specialization

The conservation biology area of 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.

Required Courses

Communications, Leadership, Policy

Choose two of the following:

FW 5003—Human Dimensions of Biological Conservation (3 cr)

NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (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)

FR 1101—Dendrology (3 cr)

FW 4129—Mammalogy (4 cr)

FW 4136—Ichthyology (4 cr)

PBio 4321—Taxonomy of Minnesota Flora (3 cr)

PBio 4511—Plant Systematics (3 cr)

Community and Ecosystem Ecology

LA 5204—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)

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)

Any Itasca Summer Session field course (4 cr)

FW 4108—Field Methods in Research and Conservation of Vertebrate Populations (Itasca) (3 cr)

FW 4106—Important Plants in Fisheries and Wildlife Habitats (Itasca) (1 cr)

Electives—Students should 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 4131—GIS in Natural Resource Analysis (3 cr)

or FW 5621—GIS for Fisheries, Wildlife, and Biological Conservation (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 3061W—Water Quality: Management of a Natural Resource (3 cr)

NRES 3575—Wetlands Conservation (3 cr)

NRES 4211—Survey, Measurement, and Modeling in Natural Resources (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.

Required Courses

Communications, Leadership, Policy

Select one of the following:

FW 5003—Human Dimensions of Biological Conservation (3 cr)

NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (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 (Itasca) (1 cr)

FW 4108—Field Methods in Research and Conservation of Vertebrate Populations (Itasca) (3 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 1012—General Principles of Biochemistry (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 Prevet 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—Students should 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 1012—General Principles of Biochemistry (3 cr)

EEB 4621—Limnology Laboratory (1 cr)

FR 4114—Forest Hydrology and Watershed Management (3 cr)

FW 5411—Aquatic Toxicology (3 cr)

FW 5455—Sustainable Aquaculture (3 cr)

FW 5621—GIS for Fisheries, Wildlife, and Biological Conservation (3 cr)

NRES 3001—Colloquium: Perspectives on Treaty Rights (2 cr)

NRES 3002—Colloquium: Exotic Species (1 cr)

NRES 3061W—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.

Required Courses

Communications, Leadership, Policy

Select one of the following:

FW 5003—Human Dimensions of Biological Conservation (3 cr)

NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (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 (Itasca) (1 cr)

FW 4108—Field Methods in Research and Conservation of Vertebrate Populations (Itasca) (3 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—Students should 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 1012—General Principles of Biochemistry (3 cr)

Biol 3409—Evolution (3 cr)

EEB 5033—Population and Quantitative Genetics (4 cr)

Ent 5041—Insect Ecology (3 cr)

FR 4114—Forest Hydrology and Watershed Management (3 cr)

FR 4232W—Management of Recreational Lands (4 cr)

FR 4262—Remote Sensing of Natural Resources (3 cr)

FR 4411—Silviculture Systems (3 cr)

or NRES 3021—Plant Resource Management and the Environment (3 cr)

FW 5571—Avian Conservation (3 cr)

FW 5621—GIS for Fisheries, Wildlife, and Biological Conservation (3 cr)

or FR 4131—GIS in Natural Resources Analysis (3 cr)

Hort 5071—Restoration and Reclamation Ecology (3 cr)

NRES 3002—Colloquium: Exotic Species (2 cr)

NRES 3575—Wetlands Conservation (3 cr)

NRES 4211—Survey, Measurement, and Modeling in Natural Resources (3 cr)

PBio 4321—Taxonomy of Minnesota Flora (3 cr)

Stat 5303—Designing Experiments (4 cr)

Fisheries and Wildlife

Minor Requirements

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 (4 cr, 4 cr)

or Phys 1201 and Phys 1202 (5 cr, 5 cr)

or Phys 1301 and Phys 1302 (4 cr, 4 cr)

VPB 2032—General Microbiology with Lab (4 cr)

or Biol 3301—Biology of Microorganisms (5 cr)

The 1998 Gourman Report ranked the fisheries and wildlife program #5 in the nation.

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 forest science. Students taking the forest management track receive more training in principles and techniques of resource management; students taking the forest science track receive more scientific and specialized training in particular aspects of forest resources.

Students should choose the forest management track or the forest science track as early as possible in their college careers.

Degree Requirements

To complete the degree, students must complete 128 credits. Students must also meet the University's liberal education requirements; see "Liberal Education" in the CNR General Information section of this catalog.

Required Courses

Communication Skills

- Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
 or EngC 1012—University Writing and Critical Reading, Emphasis on Cultural Diversity (4 cr)
 or EngC 1014—University Writing and Critical Reading, Emphasis on Public Ethics (4 cr)
- Rhet 1223—Oral Presentation in a Professional Settings (3 cr)
 or Spch 1101—Introduction to Public Speaking (3 cr)
- Rhet 3562—Technical and Professional Writing (4 cr)
 or EngC 3027—Advanced Expository Writing (4 cr)

Mathematical Thinking

- Math (see requirements in track sections)
- Stat 3011—Statistical Analysis (3 cr)
 or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences

- Biol 1009—General Biology (4 cr)
 Biol 2022—General Botany (3 cr)
 Chemistry (see requirements in track sections)
- Phys 1001—The Physical World: Energy and Its Impact on 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 (15 cr)

- ApEc 1101—Principles of Microeconomics (3 cr)
 or Econ 1101—Principles of Microeconomics (4 cr)
- NRES 3261W—Economics and Natural Resource Management (3 cr)
- Humanities—at least 6 credits including one course in literature and one course in "other humanities"
- Historical Perspective—at least one course of at least 3 credits. A course fulfilling the historical perspectives may also apply toward a designated theme requirement.

Professional Required Core Courses

Introductory Courses:

- FR 1001—Orientation and Information Systems (1 cr)
 WPS 1301—Wood as a Raw Material (3 cr)

Resource Assessment:

- FR 4218—Assessment and Modeling of Forests (3 cr)
 FR 4262—Remote Sensing of Natural Resources (3 cr)

Managing Plant, Animal, Soil, and Water Resources:

- Ent 3001—Insects and Insect Management (1 cr)
 and Ent 4251—Forest and Shade Tree Entomology (2 cr)
 or PIPa 3003—Diseases of Forest and Shade Trees (3 cr)
 FR 1101—Dendrology (3 cr)

- FR 3104—Forest Ecology (4 cr)
 FR 4411—Silviculture Systems (3 cr)
 FR 4114—Forest Hydrology and Watershed Management (3 cr)
 FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr) (recommended for freshmen or sophomores)
 or FW 5603W—Habitats and Regulation of Wildlife (3 cr) (recommended for juniors or seniors)

Field Training in Assessment and Biology of Forests (Itasca):

- FR 2101—Forest Plants (Itasca) (1 cr)
 FR 2102—Forest Ecology: Field Experience (Itasca) (2 cr)
 FR 2104—Forest Measurement Techniques (Itasca) (1 cr)

Economics, Management, Policy and Planning:

- FR 4471—Forest Management and Planning (3 cr)
 NRES 3241W—Natural Resource Policy and Administration (3 cr)

Forest Management Track

This track is for students who wish to become directly involved in forest land management or find employment in specialized areas such as resource 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. The track contains a forest harvesting option that involves a year of study at the University of Idaho.

Required Courses

Mathematics and Chemistry

- Chem 1011—General Principles of Chemistry (4 cr)
 and BioC 1012—General Principles of Biochemistry (3 cr)
 or Chem 1021—Chemical Principles I (4 cr)
 and Chem 1022—Chemical Principles II (4 cr)
- Math 1142—Short Calculus (4 cr)

Forest Management Professional Courses

- FR 4232W—Management of Recreational Lands (4 cr)
 FR 4431—Timber Harvesting and Road Planning (1 cr)
 NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (3 cr)
 or NRES 3011W—Ethics, Conflict, and Leadership in Resource Management (3 cr)

Field Training in Assessment and Management of Forest Resources

- (Taught at Cloquet Forestry Center during the Cloquet Forestry Session)
- FR 4611—Field Silviculture (3 cr)
 FR 4615—Remote Sensing and Resource Assessment: Field Applications (2 cr)
 FR 4621—Timber Harvesting and Road Planning: Field Applications (2 cr)

Enrichment Courses

Students select, with adviser approval, 10 additional credits in professional courses, which are grouped below by subject matter. At least 7 of the credits must be from courses listed below regardless of group. Students completing the Forest Harvesting Option may also choose from courses offered at the University of Idaho. Courses used to satisfy other requirements may not be used to fill the 10-credit enrichment requirement.

Managing Plant, Animal, Soil, and Water Resources

- Ent 3001—Insects and Insect Management (1 cr)
 and Ent 4251—Forest and Shade Tree Entomology (2 cr)
 FR 4118—Tree Biology (2 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)
 FW 5604W—Fisheries Ecology and Management (3 cr)
 Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
 NRES 3061W—Water Quality: Management of a Natural Resource (3 cr)
 PIPa 3003—Diseases of Forest and Shade Trees (3 cr)
 Soil 5711—Forest Soils (3 cr)

Resource Policy, Management, and Planning
 FR 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
 FR 5264—Advanced Forest Management Planning (2 cr)
 NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (3 cr)
 or NRES 3011W—Ethics, Conflict, and Leadership in Resource Management (3 cr)
 NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
 NRES 4395—Natural Resources Planning (4 cr)

Assessment and Information Systems
 FR 3601—Elements of Surveying (1 cr)
 FR 4131—Geographic Information Systems for Natural Resource Analysis (3 cr)
 FR 5228—Advanced Topics in Assessment and Modeling of Forests (3 cr)
 FR 5412—Advanced Remote Sensing (3 cr)

The 1998 Gourman Report ranked the forest resources program #1 in the nation.

Forest Harvesting Option

in the Forest Management Track

Students interested in forest harvesting and its relation to other forest management topics may complete the forest harvesting option. It provides training for careers in logging-engineering firms, forest products companies, consulting, or public agencies. Graduates may design and layout timber sales and forest roads, administer timber sales, or manage wood procurement systems. Students spend their first three years at the University of Minnesota and their senior year at the University of Idaho. Students interested in the option must consult Professor Charlie Blinn.

Course requirements for the option are those in the general forest management track with the following exceptions.

Required Courses

Students take 14 credits of forest harvesting courses taught at the University of Idaho. A current list of courses can be obtained from Professor Blinn.

Courses Omitted from Forest Harvesting Option (students are encouraged to consider these in selecting their 10 additional professional courses and their free electives):

Ent 3001—Insects and Insect Management (1 cr)
 and Ent 4251—Forest and Shade Tree Entomology (2 cr)
 FR 4232—Management of Recreational Lands (4 cr)
 FR 4471—Forest Management and Planning (3 cr)
 NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (3 cr)
 or NRES 3011W—Ethics, Conflict, and Leadership in Resource Management (3 cr)
 PIPa 3003—Diseases of Forest and Shade Trees (3 cr)

Forest Science Track

This track is for students who wish to learn the fundamentals of forest resource management while gaining depth in a basic or applied science related to forest resources. Graduates might pursue careers as forest managers, but are more likely to enter graduate school followed by careers in research, teaching, and technical support for managers and administrators. Areas of specialization include quantitative methods, economics and policy, forest ecology, silviculture, watershed management/water resources, and resource protection.

Admission to the forest science track requires approval by a faculty committee and a GPA of 3.20 or above for those in college and a high school rank in the upper tenth percentile for those entering as freshmen.

Students interested in the forest science track develop an individualized program with an adviser and submit the program for approval to a faculty committee.

Required Courses

Mathematics and Chemistry

Chem 1021—Chemical Principles I (4 cr)
 Chem 1022—Chemical Principles II (4 cr)
 Math 1271—Calculus I (4 cr)
 Math 1272—Calculus II (4 cr)

Forest Science Professional and Scientific Courses

Students must take 20 credits of professional and scientific courses, at least 15 credits of which must be in sciences. These courses must be selected in consultation with an adviser, and adviser approval is required.

Field Sessions

One or two field sessions (three weeks at Lake Itasca Forestry and Biological Station, five weeks at Cloquet Forestry Center)

Forest Resources Minor

Minor Requirements

The forest resources minor (17 credits) 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 in Itasca State Park 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 (Itasca) (1 cr)
 and FR 2102—Forest Ecology: Field Experience (Itasca) (2 cr)
 and FR 2104—Forest Measurement Techniques (Itasca) (1 cr)
 FR 3104—Forest Ecology (4 cr)
 FR 4411—Silvicultural Systems (3 cr)

Additional Required Courses (7 cr)

Forest Policy, Management, and Planning

Select at least one from the following group:
 FR 4232W—Management of Recreational Lands (3 cr)
 FR 4471—Forest Management and Planning (3 cr)
 FR 4501—Urban Forest Management (3 cr)
 NRES 3241W—Natural Resource Policy and Administration (3 cr)
 NRES 3261W—Economics and Natural Resource Management (3 cr)

Resource Assessment

FR 4131—Geographic Information Systems for Natural Resource Analysis (3 cr)
 FR 4218—Assessment and Modeling of Forests (3 cr)
 FR 4262—Remote Sensing of Natural Resources (3 cr)

Biology and Management of Vegetation, Wildlife, Water, and Soil Resources

Ent 3001—Insects and Insect Management (1 cr)
 and Ent 4251—Forest and Shade Tree Entomology (2 cr)
 FR 2101—Forest Plants (Itasca) (1 cr)
 and FR 2102—Forest Ecology: Field Experience (Itasca) (2 cr)
 and FR 2104—Forest Measurement Techniques (Itasca) (1 cr)
 FR 3501—Arboriculture (3 cr)
 FR 4114—Forest Hydrology and Watershed Management (3 cr)
 FR 4431—Timber Harvesting and Road Planning (1 cr)
 FR 5142—Tropical Forest Ecology (3 cr)
 NRES 4703—Agroforestry: Role in Watershed Management (3 cr)
 PIPa 3003—Diseases of Forest and Shade Trees (3 cr)

Natural resources management was ranked #7 in the nation by the 1998 Gourman Report.

Natural Resources and Environmental Studies

B.S.

The natural resources and environmental studies curriculum is for students interested in an interdisciplinary major focusing on the use, management, and protection of natural resources and 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.

All students complete the core curriculum of required courses listed below. In addition, students choose an area of concentration. Areas of concentration include environmental assessment and monitoring; environmental education; planning, policy, and law; resource conservation and environmental management; and water and soil resources. Courses must be selected in collaboration with an adviser. Students must complete a Concentration Contract in consultation with their faculty adviser.

Degree Requirements

To complete the degree, students must complete 120 credits.

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, Emphasis on Cultural Diversity (4 cr)
or EngC 1014—University Writing and Critical Reading, Emphasis on Public Ethics (4 cr)
- Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Spch 1101—Introduction to Public Speaking (3 cr)
- Rhet 3562—Technical and Professional Writing (4 cr)
or EngC 3027—Advanced Expository Writing (4 cr)

Mathematical Thinking

- Mathematics (see area of concentration for specific requirements)
- 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)

*Required in the resource conservation and environmental management concentration

- Chemistry (see area of concentration for specific requirements)
 Physics (see area of concentration for specific requirements)
 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)

Social Science (at least 6 cr). Complete one of the microeconomics courses below plus one additional social science course (see area of concentration for specific requirements).

- ApEc 1101—Principles of Microeconomics (3 cr)
or Econ 1101—Principles of Microeconomics (4 cr)
- To fulfill the other social science requirement, consider completing
 NRES 3261W—Economics and Natural Resource Management
or NRES 3241W—Natural Resource Policy and Administration
- Humanities (at least 6 cr, including one course in literature and one course in “other humanities”)
- Historical Perspective (at least one course of at least 3 cr). A course fulfilling the historical perspectives requirement may also apply toward a designated theme requirement.

Core 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 1201—Conservation of Natural Resources (3 cr)
 NRES 3000 *or* NRES 3001 *or* NRES 3002 *or* NRES 5001—Colloquium (choose one) (1-2 cr)
- NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 4411—Silviculture Systems (3 cr)
 NRES 3051—Experience and Training in a Field Setting (1-3 cr)
or Field Session (3-4 cr) (see concentration for recommended field session)*
- NRES 3061W—Water Quality: Management of a Natural Resource (3 cr)
or FR 4114—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 4211—Survey, Measurement, and Modeling in Natural Resources (3 cr)

*Water and Soil Resources-Water Quality Track, and Hydrology Track must complete WRS 5001—Introduction to Field Research in Water Resources.

**Both NRES 3061W and FR 4114 are required in the Water and Soil Resources-Water Quality Track.

Environmental Assessment and Monitoring Concentration

The environmental assessment and monitoring concentration focuses on 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.

Required Courses

General Education and Professional Courses

- 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 1012—General Principles of Biochemistry (3 cr)
- FR 2101, FR 2102, FR 2104—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Itasca) (4 cr)
or NRES 3051—Experience and Training in a Field Setting (1-3 cr)
and FR 1101—Dendrology (3 cr)
or EEB 4014W—Ecology of Vegetation (3 cr)
or PBio 4321—Taxonomy of Minnesota Flora (3 cr)
- FR 4131—Geographical Information Systems for Natural Resource Analysis (3 cr)
- FR 4262—Remote Sensing of Natural Resources (3 cr)
- Math 1142—Short Calculus (4 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
- NRES 4295W—GIS for Problem Solving in Environmental Science and Management (4 cr)

Phys 1001—The Physical World—Energy and Its Impact on the Environment (4 cr)

or “B” or better in high school physics

Additional Professional Courses (12 cr)

(Courses from this list may be counted toward fulfilling either core or concentration requirements, 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 (Itasca) (4 cr)

FR 3601—Elements of Surveying (1 cr)

FR 4114—Forest Hydrology and Watershed Management (3 cr)

FR 4218—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)

FW 5621—Geographic Information Systems for Fisheries, Wildlife and Biological Conservation (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)

or NRES 3205—Field Ecology in NRES (4 cr)

NRES 3061W—Water Quality: Management of a Natural Resource (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)

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 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 for teaching and learning in informal settings.

Required Courses

General Education and Professional Courses

Chem 1011—General Principles of Chemistry (4 cr)

or BioC 1012—General Principles of Biochemistry (3 cr)

FR 5403—Fundamentals of Natural Resource Education (2 cr)

Math 1142—Short Calculus (4 cr)

or Math 1271—Calculus I (4 cr)

and Math 1272—Calculus II (4 cr)

NRES 1041W—Natural Resources as Raw Materials (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 (Itasca) (4 cr)

NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (3 cr)

or NRES 3011W—Ethics, Conflict, 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 4811—Natural Resources Interpretation (3 cr)

or Rec 5311—Programming Outdoor and Environmental Education (3 cr)

Phys 1001—The Physical World - Energy and Its Impact on the Environment (4 cr)

or “B” or better in high school physics

Additional Professional Courses (15 cr)

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 5537—Special Topics: Science Education (1-8 cr)

CI 5747—Global and Environmental Education: Content and Practice (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 5204—Landscape Ecology (3 cr)

NRES 3261W—Economics and Natural Resource Management (3 cr)

NRES 3575—Wetlands Conservation (3 cr)

NRES 4101—Conservation of Plant Biodiversity (3 cr)

Pol 3872—Global Environmental Cooperation (3 cr)

Rec 5301—Wilderness and Adventure Education (3 cr)

Rhet 3383—In Search of Nature (3 cr)

Soil 5601—Principles of Waste Management (3 cr)

Spch 5451—Intercultural Communication Processes (3 cr)

Planning, Policy, and Law Concentration

The planning, policy, and law concentration focuses on planning and management activities. Emphasis is 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 subspecialty, either in planning or in policy and law.

Unique opportunities for hands-on learning experiences are available to College of Natural Resources students at two University field research stations located in Itasca State Park and Cloquet.



Required Courses**General Education and Professional Courses**

Chem 1011—General Principles of Chemistry (4 cr)
 or BioC 1012—General Principles of Biochemistry (3 cr)
 Math 1142—Short Calculus (4 cr)
 or Math 1271—Calculus I (4 cr)
 and Math 1272—Calculus II (4 cr)
 NRES 1041W—Natural Resources as Raw Materials (3 cr)
 NRES 3011W—Ethics, Conflict, and Leadership in Natural Resource Management (3 cr)
 or NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (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 (Itasca) (4 cr)
 Pol 1001—American Democracy in a Changing World (4 cr)

Students must decide which track they want to follow; the planning track or the policy and law track.

Planning Track**in the Planning, Policy, and Law Concentration****Required Courses****Additional Professional Courses**

FR 1101—Dendrology (3 cr)
 FR 4131—Geographical Information Systems for Natural Resources Analysis (3 cr)
 or FW 5621—GIS for Fisheries, Wildlife, and Biological Conservation (3 cr)
 NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)

Select 12 credits from the three groups listed below. At least 3 credits must be chosen from each group.

Social Context for Planning

ApEc 5321—Regional Economic Analysis (3 cr)
 FR 4232W—Management of Recreational Lands (4 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 (3 cr)

Biological/Physical Context for Planning

FR 4262—Remote Sensing for 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 5204—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)
 FR 4259—Analysis of Outdoor Recreation Behavior (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)

Policy and Law Track**in the Planning, Policy, and Law Concentration****Required Courses****Additional Professional Courses (6 cr)**

NRES 3241W—Natural Resource Policy and Administration (3 cr)
 NRES 3261W—Economics and Natural Resources Management (3 cr)
Select 12 credits from the three groups listed below. At least one course must be chosen from each group.

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)
 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

This concentration focuses on developing broad understanding of resource conservation and environmental management. Emphasis is on understanding the linkages between society and the environment and acquiring the leadership and management skills relevant to environmental management at local, state, and national level.

Required Courses**General Education and Professional Courses**

Biol 2012—General Zoology (4 cr)
 Biol 2022—General Botany (3 cr)
 Chem 1021 and 1022—Chemistry Principles I and II (4 cr ea)
 or Chem 1011—General Principles of Chemistry (4 cr)
 and BioC 1012—General Principles of Biochemistry (3 cr)
 Math 1142—Short Calculus (4 cr)
 or Math 1271—Calculus I (4 cr)
 and Math 1272—Calculus II (4 cr)
 NRES 1041W—Natural Resources as Raw Materials (3 cr)
 NRES 3011W—Ethics, Conflict, and Leadership in Natural Resource Management (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 (Itasca) (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)
 Phys 1001—The Physical World - Energy and Its Impact on the Environment (4 cr)
 or “B” or better in high school physics

Additional Professional Courses

At least 15 credits required from the following list. With adviser approval, up to 4 credits not in the list may be substituted.
 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 3251—Role of Renewable Natural Resources in Developing Countries (1 cr)
 FR 3601—Elements of Surveying (1 cr)
 FR 4131—GIS for Natural Resource Analysis (3 cr)
 FR 4232W—Management of Recreational Lands (4 cr)
 FR 4262—Remote Sensing of Natural Resources (3 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)
 FW 5621—GIS for Fisheries, Wildlife and Biological Conservation (3 cr)
 Geo 5108—Principles of Environmental Geology (3 cr)
 Geog 3361W—Land Use, Landscapes, and the Law (3 cr)
 Hort 5071—Landscape and Reclamation Ecology (3 cr)
 LA 5204—Landscape Ecology (3 cr)
 NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (3 cr)
 NRES 3575—Wetlands Conservation (3 cr)
 NRES 4101—Conservation of Plant Biodiversity (3 cr)
 NRES 5703—Agroforestry: Role in Watershed Management
 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)
 PIPa 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)
 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)

For students interested in waste management, the following courses are highly recommended. Not all courses are available every year. For more about solid waste management courses, consult with an adviser in the CNR Student Services Office.

SolW 6003—Legal, Regulatory, and Policy Framework of Solid Waste Management (3 cr)
 SolW 6005—Applied Economics of Solid Waste (2 cr)
 SolW 6007—Solid Waste Management Seminar (1 cr)

Water and Soil Resources Concentration

This concentration focuses on the management of water and soil resources to achieve a balance between management practices and resulting water or soil quality. The emphasis is on informed decision making; ecological approaches to water resource management; water movement, storage, and hydrologic cycles; prevention of soil erosion, land degradation, and resulting impacts on off-site resources.

Students must select one of three available tracks: the water quality track, the hydrology track, or the soil and water conservation track.

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 a water quality technician in a watershed district or other governmental unit, or in a private organization.

Required Courses

General Education and Professional Courses

Chem 1021/1022—Chemical Principles I and II (4 cr ea)
 Chem 2101—Introduction to Analytical Chemistry Lecture (3 cr)
 and Chem 2111—Introduction to Analytical Chemistry Lab (2 cr)
 or CE 4541—Environmental Water Chemistry (4 cr)
 EEB 4601—Limnology (3 cr)
 FR 4114—Forest Hydrology and Watershed Management (3 cr)
 Math 1142—Short Calculus (4 cr)
 or Math 1271—Calculus I (4 cr)
 and Math 1272—Calculus II (4 cr)
 NRES 3061W—Water Quality: Management of a Natural Resource (3 cr)
 Phys 1001—The Physical World—Energy and Its Impact on the Environment (4 cr)
 or Phys 1011—Fundamental Physics (4 cr)
 WRS 5001—Introduction to Field Research in Water Resources (Itasca) (2 cr)
 WRS 5101—Water Resources: Individuals and Institutions (3 cr)
 or NRES 3241—Natural Resource Policy and Administration (3 cr)
In consultation with your adviser, select 12 credits from the following list:
 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 4131—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 3575—Wetlands Conservation (3 cr)
 NRES 5002—Colloquium—Restoration of Aquatic Ecosystems (1 cr)
 Soil 5555—Wetland Soils (2 cr)

Hydrology Track in the Water and Soil Resources Concentration

Students completing the hydrology track are eligible for state and federal certification as hydrologists. They can serve as a hydrologist or water resource technician in a watershed district or other governmental unit, or in a private organization.

Required Courses

General Education and Professional Courses

CE 3502—Fluid Mechanics (3 cr)
 Chem 1021/1022—Chemical Principles I and II (4 cr ea)
 or Chem 1011—General Principles of Chemistry (4 cr)
 and BioC 1012—General Principles of Biochemistry (4 cr)
 FR 4114—Forest Hydrology and Watershed Management (3 cr)
 Geo 5701—General Hydrogeology (4 cr)
 Math 1271/1272—Calculus I and II (4 cr ea)
 Math 2243—Linear Algebra and Differential Equations (3 cr)
 NRES 3061W—Water Quality: Management of a Natural Resource (3 cr)
 or CE 4541—Environmental Water Chemistry (4 cr)
 Phys 1201/1202—General Physics I and II (5 cr ea)
 or Phys 1101/1102—Fundamental Physics I and II (4 cr ea)
 WRS 5001—Introduction to Field Research in Water Resources (Itasca) (2 cr)
 WRS 5101—Water Resources: Individuals and Institutions (3 cr)
 or NRES 3241W—Natural Resource Policy and Administration (3 cr)
 or Geo 2004—Water and Society (3 cr)
Choose three of the following:
 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 (2-3 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 a soil conservationist with the USDA Natural Resource Conservation Service. They can serve as a soil and water conservationist in a watershed district or other governmental unit, or in a private organization.

Required Courses

General Education and Professional Courses

Chem 1021/1022—Chemical Principles I and II (4 cr ea)
 or Chem 1011—General Principles of Chemistry (4 cr)
 and BioC 1012—General Principles of Biochemistry (4 cr)
 FR 4114—Forest Hydrology and Watershed Management (3 cr)
 or NRES 3061W—Water Quality: Management of a Natural Resource (3 cr)
 FR 4131—Geographic Information Systems for Natural Resource Analysis (3 cr)
 FR 4262—Remote Sensing in Natural Resources (3 cr)
 Math 1142—Short Calculus (4 cr)
 or Math 1271—Calculus I (4 cr)
 and Math 1272—Calculus II (4 cr)
 NRES 3261W—Economics and Natural Resource Economics (3 cr)
 Phys 1001—The Physical World: Energy and Its Impact on the Environment (4 cr)
 or “B” or better in high school physics
 Soil 3221—Soil Conservation and Land Use Management (3)
 Soil 3416—Plant Nutrients in the Environment (3 cr)
 or Soil 3612—Soil and Environmental Biology (3 cr)
 Soil 4511—Field Soils (3 cr)
 Soil 5555—Wetland Soils (3 cr)
 WRS 5001—Introduction to Field Research in Water Resources (Itasca) (2 cr)
 or NRES 3051—Experience and Training in a Field Setting (1-3 cr)
 or NRES 3205—Field Ecology in NRES (4 cr)
 WRS 5101—Water Resources: Individuals and Institutions (3 cr)
 or NRES 3241W—Natural Resource Policy and Administration (3 cr)

Recreation Resource Management

Department of Forest Resources

B.S.

The recreation resource management curriculum prepares students for careers in planning or managing the use of recreational land and water, and for graduate study. The curriculum emphasizes natural and managed non-urban areas; administration of natural resources-oriented recreation programs in public and private sectors; social science aspects of natural resources use; and skills in communication, planning, and management.

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 128 credits. Students must also complete the University’s liberal education requirements; see “Liberal Education” in the CNR general information section of this catalog.

Required Courses

Communication Skills

Rhet 1101—Writing to Inform, Convince and Persuade (4 cr)
 or EngC 1013—University Writing and Critical Reading, Emphasis on the Environment (4 cr)

Students who are exempt from taking freshman composition must take Rhet 1152—Writing on Issues of Science and Technology (3 cr)

Rhet 1223—Oral Presentations in Professional Settings (3 cr)
 or Spch 1101—Introduction to Public Speaking (3 cr)
 Rhet 3562—Technical and Professional Writing (4 cr)
 or EngC 3027—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, Biological and Earth Sciences

Biol 1009—General Biology (4 cr)
 Biol 2022—General Botany (3 cr)
 Chem 1011—General Principles of Chemistry (4 cr)
 or BioC 1012 General Principles of Biochemistry (3 cr)
 Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
 Soil 1125—The Soil Resource (4 cr)
 or Soil 2125—Basic Soil Science (4 cr)

Social Sciences and Humanities

ApEc 1101—Principles of Microeconomics (3 cr)
 ApEc 1102—Principles of Macroeconomics (3 cr)
 or NRES 3261W—Economics and Natural Resources Management (3 cr)

Select one of the following four groups:

Psy 1001—Introduction to Psychology (4 cr)
 and Psy 3201—Introduction to Social Psychology (4 cr)
 or Soc 1001—Introduction to Sociology (3 cr)
 and Soc 3711—Principles of Social Organization (3 cr)
 or Soc 1001—Introduction to Sociology (3 cr)
 and Soc 3411—Understanding Formal Organizations (3 cr)
 or Soc 1001—Introduction to Sociology (3 cr)
 and Soc 3721—Principles of Social Psychology (3 cr)

Humanities—One course in literature and one course in “other humanities” (at least 6 cr)

Historical Perspective—At least one course of at least 3 credits. A course that fulfills the historical perspective requirements may also apply toward a designated theme.

Professional Courses

Introductory and General

FR 1001—Orientation and Information Systems (1 cr)
 or NRES 1001—Orientation and Information Systems (1 cr)

Resource Assessment

FR 4131—GIS for Natural Resources Analysis (3 cr)
 LA 3501—Environmental Design and its Biological and Physical Context (3 cr)
 NRES 4211—Survey, Measurements and Modeling in Natural Resources (3 cr)

Management of Vegetation, Wildlife, Soil, and Water Resources

FR 1101—Dendrology (3 cr)
 FR 3104—Forest Ecology (4 cr)
 or EEB 3001—Ecology and Society (3 cr)
 or Biol 3407—Ecology (3 cr)
 FR 4114—Forest Hydrology and Watershed Management (3 cr)
 or NRES 3061W—Water Quality: Management of a Natural Resource (3 cr)
 FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
 or NRES 4101—Conservation of Plant Biodiversity (3 cr)
 NRES 3021—Plant Resource Management and the Environment (3 cr)
 or FR 4411—Silviculture Systems (3 cr)

Policy, Management, and Planning

- FR 4232W—Management of Recreational Lands (4 cr)
 FR 4259—Analysis of Outdoor Recreation Behavior (3 cr)
 NRES 3011W—Ethics, Conflict and Leadership in Resource Management (3 cr)
 NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (3 cr)
 NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
 NRES 4195W—Problem Solving in Natural Resources and Environmental Studies (4 cr)
 Rec 3551—Administration and Finance of Leisure Services (4 cr)
 or Rec 5191—Commercial Recreation and Tourism (3 cr)

Other Required Professional Courses

Choose one course from each of the three groups:

Social and Managerial Sciences

- Anth 3041—Ecological Anthropology (3 cr)
 ApEc 4311—Tourism Development Principles, Processes, Policies (3 cr)
 Geog 3361—Land Use, Landscapes, and the Law (3 cr)
 Geog 5724—The Meaning of Place (3 cr)
 NRES 3241W—Natural Resource Policy and Administration (3 cr)
 Rhet 3266—Group Process, Team Building, and Leadership (3 cr)

Recreation Programming and Management Services

- NRES 4811—Natural Resources Interpretation and Communication (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)

Management of Vegetation, Soil, and Water Resources

- FR 2101—Forest Plants (Itasca) (1 cr)
 and FR 2102—Forest Ecology: Field Experience (Itasca) (2 cr)
 and FR 2104—Forest Measurement Techniques (Itasca) (1 cr)
 FR 4262—Remote Sensing of Natural Resources (3 cr)
 Hort 5071—Restoration and Reclamation Ecology (3 cr)
 LA 5204—Landscape Ecology (3 cr)
 Free Electives (8-13 cr): Students should meet with their adviser when choosing these courses.

Urban Forestry

Department of Forest Resources**B.S.**

The urban 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 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 128 credits. Those students going into consulting or private business concentrate professional electives in the forest health and cultural practices of urban forestry. Students interested in managing the urban landscape will concentrate on electives in the management and administration areas.

Students must also complete the University's liberal education requirements; see "Liberal Education" in the CNR general information section of this catalog.

Required Courses**Communication Skills**

- Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
 or EngC 1012—University Writing and Critical Reading, Emphasis on Cultural Diversity (4 cr)
 or EngC 1014—University Writing and Critical Reading, Emphasis on Public Ethics (4 cr)
 Rhet 1223—Oral Presentation in Professional Setting (3 cr)
 or Spch 1101—Introduction to Public Speaking (3 cr)
 Rhet 3266—Group Process, Team Building and Leadership (3 cr)
 Rhet 3562—Technical and Professional Writing (4 cr)
 or EngC 3027—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 (3 cr)
 or Stat 5021—Statistical Analysis (4 cr)

Physical and Biological Sciences

- Biol 1009—General Biology (4 cr)
 Biol 2022—General Botany (3 cr)
 Chem 1011—General Principles of Chemistry (4 cr)
 and BioC 1012—General Principles of Biochemistry (3 cr)
 or Chem 1021—Chemical Principles I (4 cr)
 and Chem 1022—Chemical Principles II (4 cr)
 Phys 1001—The Physical World—Energy and Its Impact on the Environment (4 cr)
 or Phys 1101—Fundamental Physics I (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)
 Pol 1001—American Democracy in a Changing World (4 cr)
 Humanities—at least 6 cr, including one course in literature and one course in "other humanities")
 Historical Perspective—At least one course of at least 3 credits. A course that fulfills the historical perspectives requirement may also apply toward a designated theme.

Professional Core**Introductory**

- FR 1001—Orientation and Information Systems (1 cr)

Resource Assessment

- FR 4131—GIS for Natural Resources Analysis (3 cr)
 NRES 4211—Survey, Measurements and Modeling in Natural Resources (3 cr)

Field Training in the Assessment and Biology of Forests

- FR 2101—Forest Plants (1 cr, Itasca)
 FR 2102—Forest Ecology Field Experience (2 cr, Itasca)
 FR 2104—Forest Measurement Techniques (1 cr, Itasca)

Management of Vegetation, Wildlife, Soil, and Water Resources

- Ent 3001—Insects and Insect Management (1 cr)
 Ent 4251—Forest and Shade Tree Entomology (2 cr)
 FR 1101—Dendrology (3 cr)
 or Hort—1012 Woody Plant Materials (3 cr)
 FR 3104—Forest Ecology (4 cr)
 FR 3501—Arboriculture (3 cr)
 FR 4114—Forest Hydrology and Watershed Management (3 cr)
 or NRES—3061 Water Quality: Management of a Natural Resource (3 cr)
 FR 4118—Tree Biology (2 cr)
 FR 4411—Silviculture Systems (3 cr)
 FR 4501—Urban Forest Management (3 cr)
 PIPa 3003—Diseases of Forest and Shade Trees (3 cr)

The College of
 Natural Resources
 has an 11 to 1
 student-faculty
 ratio, ensuring
 personal attention
 from world-class
 instructors.

Economics, Management, and Policy

FR 4232W—Management of Recreational Lands (4 cr)
 NRES 3241W—Natural Resource Policy and Administration (3 cr)
 NRES 3261W—Economics and Natural Resources Management (3 cr)
 Urbs 3001—Introduction to Urban Studies: The Complexity of Metropolitan Life (3 cr)

Additional Professional Courses

Students take 14 cr selected from the following groups and approved by a faculty adviser; at least 9 cr must be taken from one of the groups:

Forest Health and Cultural Practices

FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
 FW 5603W—Habitats and Regulation of Wildlife (3 cr)
 Hort 1001—Plant Propagation (4 cr)
 Hort 3005—Environmental Effects on Horticultural Crop (2 cr)
 Hort 4021—Landscape Design, Implementation, and Management I (4 cr)
 Hort 4041—Nursery Production and Management I (3 cr)
 Soil 3416—Plant Nutrients in the Environment (3 cr)
 WPS 1301—Wood as a Raw Material (3 cr)

Management and Administration

Anth 3041—Ecological Anthropology (3 cr)
 ApEc 5321—Regional Economic Analysis (3 cr)
 FR 4131—Geographic Information Systems in Natural Resource Analysis (3 cr)
 FR 4262—Remote Sensing of Natural Resources (3 cr)
 Geog 3371—Introduction to Urban Geography (3 cr)
 LA 3501—Environmental Design and Its Biological and Physical Context (3 cr)
 Mgmt 3001—Fundamentals of Management (2 cr)
 NRES 1201—Conservation of Natural Resources (3 cr)
 NRES 3000/5000—Colloquium in Natural Resources and Environmental Studies (1-2 cr)
 NRES 3202W—Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships (3 cr)
 Soc 1001—Introduction to Sociology (3 cr)
 Soc 3451—Urban Community (3 cr)

Minor Requirements

The urban forestry minor (16 credits) 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 4501—Urban Forest Management (3 cr)
 PIPa 3003—Diseases of Forest and Shade Trees (3 cr)
 or Ent 3001—Insects and Insect Management (1 cr)
 and Ent 4251—Forest and Shade Tree Entomology (2 cr)

Additional Required Courses

Select at least 10 credits from the following list:

FR 3104—Forest Ecology (4 cr)
 or FR 2101—Forest Plants (Itasca) (1 cr)
 and FR 2102—Forest Ecology: Field Experience (Itasca) (2 cr)
 and FR 2104—Forest Management Techniques (Itasca) (1 cr)
 FR 4118—Tree Biology (2 cr)
 FR 4218—Assessment and Modeling of Forests (3 cr)
 FR 4232W—Management of Recreational Lands (4 cr)
 Hort 1012—Woody Plant Materials (3 cr)
 NRES 4211—Survey, Measurements, and Modeling in Natural Resources (3 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.

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. For more information, contact Joe Massey, Head, Department of Wood and Paper Science at 612-624-7459 or jmassey@forestry.umn.edu.

Degree Requirements

To complete the degree, students must complete 128 credits.

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, Emphasis on Cultural Diversity (4 cr)
 or EngC 1014—University Writing and Critical Reading, Emphasis on Public Ethics (4 cr)
 Rhet 1223—Oral Presentation in Professional Setting (3 cr)
 or Spch 1101—Introduction to Public Speaking (3 cr)
 Rhet 3562—Technical and Professional Writing (4 cr)
 or EngC 3027—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 1012—General Principles of Biochemistry (3 cr)
 Phys 1101—Fundamental Physics I (4 cr)
 Phys 1102—Fundamental 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)

Humanities—at least 6 cr, including one course in literature and one course in “other humanities.”
 Historical Perspective—At least one course of at least 3 cr. A course fulfilling the historical perspectives requirement may also apply toward a designated theme requirement.

Wood and Paper Science

- WPS 1001—Wood and Paper Science Professional Orientation (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)

Marketing/Business

- Acct 2050—Introduction to Financial Reporting (4 cr)
- Acct 3001—Introduction to Management Accounting (4 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 Courses

- CSci 1101—Introduction to Computers and Problem Solving (3 cr)
- NRES 1041W—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)

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.

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. For more information, contact Joe Massey, Head, Department of Wood and Paper Science at 612-624-7459 or jmassey@forestry.umn.edu.

Degree Requirements

To complete the degree, students must complete at least 132 credits. Students must also complete the University’s liberal education requirements, see “Liberal Education” in the CNR general information section of this catalog.

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)

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 I (4 cr)
- Phys 1302—Introductory Physics II (4 cr)

Social Sciences and Humanities (15 cr)

- ApEc 1101—Principles of Microeconomics (3 cr)
- NRES 3241W—Natural Resource Policy and Administration (3 cr)

Humanities—at least 6 cr, including one course in literature and one course in “other humanities.”
 Historical Perspective—At least one course of at least 3 cr. A course fulfilling the historical perspectives requirement may also apply toward a designated theme requirement.

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)

All paper science and engineering graduates in the class of '98 had employment offers prior to graduation that provided an average starting salary of \$46,500.



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 4322—Biological and Environmental Science of Paper (2 cr)
 WPS 4321—Material Science of Paper (3 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)
 Stat 5021—Statistical Analysis (4 cr)

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.

Minor Requirements

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. For more information, contact Joe Massey, Head, Department of Wood and Paper Science at 612-624-7459 or jmassey@forestry.umn.edu.

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. For more information, see "Liberal Education" in the CNR general information section of this catalog.

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 Emphasis on Cultural Diversity (4 cr)
or EngC 1014—University Writing and Critical Reading, Emphasis on Public Ethics (4 cr)
 Rhet 1223—Oral Presentation in Professional Setting (3 cr)
or Spch 1101—Introduction to Public Speaking (3 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)
 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 1012—General Principles of Biochemistry (3 cr)
 Phys 1101—Fundamental Physics I (4 cr)
 Phys 1102—Fundamental 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)
 Humanities—at least 6 cr, including one course in literature and one course in "other humanities."
 Historical Perspective—At least one course of at least 3 credits. A course fulfilling the historical perspectives requirement may also apply toward a designated theme requirement.

Wood and Paper Science

WPS 1001—Wood and Paper Science Profession Orientation (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

IE 4521—Statistics, Quality, and Reliability (4 cr)
 IE 5531—Engineering Optimization I (4 cr)
 IE 5551—Production Planning and Control (4 cr)
 IE 5552—Design and Analysis of Manufacturing Systems (4 cr)
 HRIR 3021—Human Resource Management and Industrial Relations (2 cr)
 OMS 3001—Introduction to Operations Management (2 cr)
 OMS 3056—Production and Inventory Management (4 cr)

Additional Required Courses

CSci 1101—Introduction to Computers and Problem Solving (3 cr)
 NRES 1041W—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)

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. For more information, contact Joe Massey, Head, Department of Wood and Paper Science at 612-624-7459 or jmassey@forestry.umn.edu.

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. For more information, see "Liberal Education" in the CNR general information section of this catalog.

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 Emphasis on Cultural Diversity (4 cr)
 or EngC 1014—University Writing and Critical Reading, Emphasis on Public Ethics (4 cr)
 Rhet 1223—Oral Presentation in Professional Setting (3 cr)
 or Spch 1101—Introduction to Public Speaking (3 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)
 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 1012—General Principles of Biochemistry (3 cr)
 Phys 1101—Fundamentals of Physics I (4 cr)
 Phys 1102—Fundamentals of 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)
 Psy 1001—Introduction to Psychology (4 cr)
 Humanities—at least 6 cr, including one course in literature and one course in "other humanities."
 Arch 1401—The Designed Environment (3 cr)
 Historical Perspective—At least one course of at least 3 cr. A course fulfilling the historical perspectives requirement may also apply toward a designated theme requirement.

Wood and Paper Science

WPS 1001—Wood and Paper Science Profession Orientation (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)

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)
 Mktg 3001—Principles of Marketing (2 cr)
 OMS 3001—Introduction to Operations Management (2 cr)

Additional Required Courses

CSci 1101—Introduction to Computers and Problem Solving (3 cr)
 NRES 1041W—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)
 WPS 4401W—Forest Products Marketing (4 cr)

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.

The Department of
 Wood and Paper
 Science offers a
 one-week tour of
 the Great Lakes
 states industries
 during
 intersession.

School of Nursing

This is the School of Nursing section
of the 2000-2002 University of
Minnesota Undergraduate Catalog.

Nursing

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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

The nursing major builds on a foundation of prerequisite courses in the natural and behavioral sciences. Below are the prerequisites:

Content Areas	Minimum Semester Credits
Anatomy and physiology (either combined or separate courses)	6
Arts/humanities	3
Biochemistry or organic chemistry	3
Cultural anthropology or sociology	3
Freshman writing	3
General psychology	3
Growth and development	3
Literature	3
Microbiology	2
Nutrition	3
Pathophysiology	3
Pharmacology	3
Philosophy	3
Public health	2
Upper division statistics	3

The School of Nursing admits students fall semester only. The application deadline is February 15. Selection is competitive because enrollment is limited to approximately 98 students.

An admission GPA of 2.80 is preferred. The GPA is based on prerequisites, and nine of the prerequisite courses must be completed to apply. Effective fall 2001, prerequisite coursework must be completed within 10 years before entering the School of Nursing.

The School of Nursing strongly recommends that students complete the University of Minnesota liberal education requirements before beginning the nursing curriculum. Students who have completed a bachelor's degree are exempt from all liberal education requirements and need only fulfill the requirements of the program or major. All prerequisite coursework must be completed by August 27.

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.

Admission is granted pending satisfactory completion of all prerequisites with the preferred GPA of 2.80. All prerequisite coursework must be completed with grades of A, B, C, S, or P. Two-thirds of admission credits must be taken on a letter-grade basis; one-third may be taken on a satisfactory-not satisfactory credit basis. If a prerequisite course is repeated, the highest grade received is used in calculating the admission GPA.

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.

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 Health Sciences 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 or Status*, available in 200 Fraser Hall or on the Web at <<http://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, <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.

According to the *Gourman Report*, the School of Nursing undergraduate program is ranked 12th in the nation.

The average 1999 starting salary of an RN, BSN was \$39,000 in Minnesota.

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. and Ph.D. degrees 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, they 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 Office of the Registrar, 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 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 and career counseling for prenursing students is provided in the College of Liberal Arts (CLA) Pre-Health Sciences Advising Center (612-624-9006) in 30 Johnston Hall. The Pre-Health Sciences Advising Center also offers weekly first-step meetings to all students interested in nursing. Prerequisites and application procedures are discussed. For dates and time or to RSVP, call 612-624-9006.

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—This organization 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—This 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
- 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

Directory

(area code 612)

<www.nursing.umn.edu>

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
624-4330

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

Find it



Review frequently
asked questions at
<www.nursing.umn.edu>.

School of
Nursing

School of Nursing

Degree Program

Ninety-six percent of the 1999 School of Nursing alumni passed the Minnesota state nursing licensure exam the first time taken.

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 intersession. 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.

Admission Requirements—Applicants must complete nine prerequisite courses by February 15 and all prerequisite coursework by August 27.

Degree Requirements

To complete the degree, students must complete at least 128 credits, including at least 64 credits in the major.

Program requirements also include 46–48 credits of lower and upper division prerequisite coursework in the following areas: English composition, biochemistry or organic chemistry, anthropology or introductory sociology, general psychology, life span growth and development, human anatomy, human physiology, microbiology, nutrition, upper division statistics, public health, pathophysiology, pharmacology, literature, philosophy, and arts/humanities.

All prerequisite coursework must be completed and documentation of passing submitted by August 27 of the year the student is admitted to the School of Nursing.

Required Courses

Students must choose the 46–48 credits of prerequisite courses from the following list:

Anth 1003 or GC 1211 or GC 1285 or Soc 1001

BioC 1012 or Chem 2301 or BioC 3001

CBN 3001

EngC 1011 or EngC 1012 or EngC 1013 or EngC 1014 or Rhet 1101 or GC 1421 and GC 1422

FScN 1112

GC 1283 or Nurs 3690 and Nurs 3691

MicB 4001 or FScN 1021 or VPB 2022

LaMP 4172 or LaMP 4177

Phel 5100

Phsl 3051

Psy 1001 or GC 1281

Psy 3005 or EPsy 3264 or Stat 3011

Choose one course from each of the following three areas: literature, philosophy, and arts/humanities. These courses may be from any department and any level.

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 4102—Foundational Interventions for Nursing

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 4205—Nursing Theory and Research

Nurs 4206—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 4310—Holistic Care of Childbearing Families

Nurs 4306—Health Care Delivery Systems

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 4405—Honors Course: Applied Research and Research Utilization

Nurs 4406—Leadership and Management for Shaping Professional Nursing Practice

Nurs 4407—Honors Course: Seeking Solutions to Global Health Issues

Nurs 4410—Critical Care Nursing

Nurs 4501—Critical Care Nursing Practice

Nurs 4800—Nursing Topics

Nurs 4801—Research Topics

Reserve Officers Training Corps

This is the ROTC section of the
2000-2002 University of Minnesota
Undergraduate Catalog.

ROTC

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Reserve Officers Training Corps

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. Enrollment in an advanced course normally obligates students to a service commitment.

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 Office of the Vice President for Student Development and 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 textbook expenses. Additionally, scholarship students receive a subsistence allowance of \$200 per month. Nonscholarship students in their junior and senior years receive the \$200 per month 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 252).

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 December 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 ROTC program to prepare men and women to serve as second lieutenants in the Regular Army, National Guard, and Army Reserve. Army ROTC provides cadets with basic concepts and principles of military art and science, leadership, ethics, integrity, honor, and responsibility. Military science courses are offered in two- and four-year sequences that students complete concurrently with academic coursework required for earning a University degree. Students register and earn academic credits for Army ROTC courses in the same manner as for other elective courses in their curriculum. An academic minor in military science is available but not required for commissioning as an officer in the U.S. Army.

Programs

Two programs are available for students to earn their commissions as second lieutenants through Army ROTC.

Four-Year Program—The four-year Army ROTC program is divided into two parts, the basic course and the advanced course. The basic course is normally taken during the first two years of college and covers such subjects as Army customs, traditions, and organization; national defense; military history; marksmanship; land navigation; first aid; orienteering; ethics; and leadership development. Except for students on scholarship, enrollment in the basic course requires no future military obligation. All full-time University students are eligible to enroll in this course.

After completing the basic course, students who meet the physical and scholastic standards and have demonstrated the potential to become Army officers are eligible to enroll in the advanced course. The advanced course is taken during the final two years of college and includes advanced on-campus instruction and a mandatory six-week advanced camp at Fort Lewis, Washington, held the summer between the two years of the course. Full course credit and recommendation for a commission are not granted without successful camp completion. Qualified students have the opportunity to receive airborne, air assault, mountain, and northern warfare training. Enrollment in the advanced course requires the student to agree in writing to complete the two-year course and accept, if offered, a commission as a second lieutenant.

Two-Year Program—The two-year Army ROTC program enables eligible students with acceptable advanced placement credits to bypass the basic course and enroll directly in the advanced course once they are academic juniors.

The primary method of obtaining advanced placement credits is for students to attend a six-week ROTC basic camp at Fort Knox, Kentucky, the summer after their freshman or sophomore years. Veterans and members of the Army National Guard or Army Reserve may use their prior military service to gain advanced placement in the program.

Students who have completed at least three years of a Junior ROTC program at a military school or high school may be accepted for advanced placement on an individual basis. Students who have ROTC experience at other colleges receive credit for ROTC instruction completed.

Interested individuals must apply in person to the Department of Military Science for advanced placement or participation in the basic camp.

For more than 150 years, on-campus military training and ROTC programs have provided intelligent, well-educated leaders for the nation's defense.

Students attending other colleges in the area may also enroll in Army ROTC at the University of Minnesota through the College of Continuing Education and are eligible for the same programs and scholarships available to University students.

A specially designed program for nursing students is also offered through ROTC to students enrolled in either the four- or two-year program.

Benefits

The department supplies all ROTC texts and uniforms. Students in the advanced course also receive a \$150 monthly allowance during those two academic years.

Students attending the basic or advanced camps are paid travel expenses and a salary. All food, housing, and clothing are furnished.

Students who receive their bachelor's degree and are commissioned through the Army ROTC program may request a delay in reporting for duty in order to continue their education. If approved, an additional two years are allowed for graduate study.

Scholarships

Many Army scholarship programs are available. Students can receive four-, three-, or two-year scholarships. Four-year scholarships are offered annually to outstanding high school students. Applications must be submitted between July 1 and November 15 of the applicant's senior year in high school.

All students, whether enrolled in Army ROTC or not, are eligible to compete for three- and two-year scholarships after completing their first or second years of college. In addition to the national competition, the professor of military science may award three- and two-year scholarships to students on campus.

For those awarded scholarships, the Army pays tuition, fees, and \$450 per year for textbook expenses and supplies. In addition, students receive \$150 per month for the duration of the scholarship. Scholarship students selected for active duty incur a four-year active duty obligation after graduation.

Scholarships are also available from the National Guard, Army Reserve, American Legion, Association of United States Army, Reserve Officers Association, Society of American Military Engineers, ROTC Alumni Association, and Veterans of Foreign Wars.

Commissions and Obligations

Completing the Army ROTC program qualifies graduates for appointments as second lieutenants in the Army, Army Reserve, or Army National Guard. These appointments include an obligation to serve on active duty for three months to four years, depending on Army officer requirements at the time of graduation. Officers commissioned in the Army National Guard or Army Reserve serve for eight years. Nonscholarship and some scholarship students may have a guarantee of reserve forces duty. The branch of service in which students are commissioned depends on such factors as their interests, academic majors, advanced camp performance, and the Army's needs.

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, coastal and celestial navigation, shipboard operations, organization, management, leadership, and ethics, plus 120 hours of professional training in military ceremonies, customs, and skills, including computer-based warfare simulations and various hands-on training opportunities.

Upon receiving their commissions, graduates move into various careers. A newly commissioned 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, fees, and books plus a subsistence allowance of \$150 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 \$150 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 December 1 for enrollment the following fall semester.

Navy option scholarship students 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 college-level math course and any 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 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. Mgmt 3001—Fundamentals of Management is required during the senior year for Navy midshipmen.

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 2202—Ship Systems II (Science and Technology in Naval Weapons Systems)

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 4401—Leadership and Management I
Nav 4402—Leadership, Management, and Ethics II

Marine Option—Second Year

Nav 2000—Professional Training in Naval Science
Nav 3310—Evolution of Warfare

Marine Option—Third Year

Nav 3000—Professional Training in Naval Science
Nav 4410—Amphibious Warfare

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 offers four-, three-, and two-year commissioning programs. Under the four-year program students register for AFROTC courses beginning in their freshman year and complete a four-year academic curriculum that includes a four-week field training encampment between their sophomore and junior years. Students electing the two-year program complete the last two years of the AFROTC program after attending a five-week field training encampment during the summer immediately preceding their last two years at the University. Other arrangements are possible on a case-by-case basis.

The vast scope of the Air Force is difficult to portray in the classroom; 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.

Curriculum

The first two years of the aerospace studies program, General Military Course (GMC), consists of a 1-credit course per semester. The last two years, Professional Officer Course (POC), consists of a 3-credit course per semester.

In addition to classroom study, all AFROTC cadets must complete 21 hours of Leadership Laboratory each semester. 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 on a competitive basis. 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 (a four-week course for the four-year program; a five-week course for the three- and two-year programs).

Applicants selected for flight training must be able to complete graduation requirements and be commissioned before reaching 26½ years of age. Other applicants must be able to complete graduation requirements before age 30, although deserving students may obtain a waiver to complete the requirements up to age 35.

Note: Public law currently prohibits AFROTC from giving scholarships to individuals who will be 27 or older before they graduate unless they are veterans.

Admission to AFROTC academic courses is open to all interested students with Department of Aerospace Studies approval.

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 \$200 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 flight training incur a four-year active duty commitment. Those who enter the pilot and navigator programs incur a commitment of ten and six years active duty, respectively, after completing their training. Scholarship recipients who receive five years of scholarship benefits incur a five-year commitment.

Scholarship Programs

AFROTC offers many scholarships. These scholarships may cover full tuition, fees, and books plus a \$200 monthly, nontaxable allowance paid directly to the student. Three- and four-year scholarships are available on a competitive basis to high school seniors. Scholarship recipients are chosen by a national selection board. Applications are usually available early each summer, with a deadline of December 1 for enrollment the following fall semester. Two- and three-year scholarships are available for current and transferring college students on a competitive basis; requirements for these scholarships vary considerably by academic degree.

Each AFROTC detachment has two scholarships available for the most deserving cadets in the program. AFROTC also offers a noncompetitive, two-year scholarship (open to all degrees) that pays \$3,000 per year for tuition, books, and fees plus the \$200 monthly, nontaxable allowance. For the most current information about scholarship options and requirements, call 612-624-2884.

ROTC scholarship programs provide up to four years of subsidized education, paying all tuition costs, instructional fees, and textbook expenses.

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@tc.umn.edu
<www.tc.umn.edu.arotc>

Naval Science (Navy-Marine ROTC)

Captain Wayne K. Frey, USN
203 Armory Building
15 Church Street S.E.
Minneapolis, MN 55455-0137
625-6677
E-mail: nrotc@tc.umn.edu
<www.umn.edu/nrotc/>

Aerospace Studies (Air Force ROTC)

Colonel Jaromir J. Bon, USAF
3 Armory Building
15 Church Street S.E.
Minneapolis, MN 55455-0137
624-2884
E-mail: det415@tc.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

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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, C, 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: automatic admission or admission by individual review in which freshman applicants whose records do not meet automatic admission requirements are evaluated through the Office of Admissions' individual review process. Students who do not meet criteria for automatic admission should still apply.

Automatic Admission—Students are automatically admitted to IT as freshmen if they

1. submit a complete application, including all test scores and transcripts, with a \$25 application fee before the freshman class fills (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 130 or better, or SAR of 193 or better, guarantees admission. If a student's AAR or SAR are 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 2000 application period. Students should contact the Office of Admissions (612-625-2008) for the most current admission criteria.

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 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, and NSP serve as advisers to IT students through this program. Arrangements to participate are made in 128 Lind Hall.

IT undecided students follow the same first-year academic program as that followed by IT students with a specified major. (See page 261 for requirements common to all IT basic lower division curricula.)

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/equiv>). 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*.

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.). 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.

IT's "cohort" program places new students into teams that take classes together—helping freshmen meet other students, form study groups, and establish friendships.

The Minneapolis campus Medical School has approved the following courses to fulfill its premedical requirements.

Biol 1009 plus 5 cr in biology, zoology, or genetics (10 cr)

BioC 3021, 4025—biochemistry with lab (5 cr)

Chem 1021-1022, 2101, 2111, 2301, 2302, 4121 (25 cr)

EngC 1011 and literature (12 cr)

Math 1271-1272—mathematics through calculus (8 cr)

Phys 1201, 1202 or 1301, 1302 (8 cr)

At least 18 cr, taken A-F, in humanities, social sciences, foreign language, or other liberal arts areas (literature and humanities recommended)

Students considering careers in medical research or academic medicine should complete additional electives in these fields beyond the basic requirements listed above. Although reading knowledge of a foreign language is not an admission requirement, it is recommended for students interested in medical research or postdoctoral study in medicine.

The Pre-Health Sciences Library, 30 Johnston Hall, contains catalogs for all U.S. and Canadian medical schools as well as career information about medical and paramedical fields.

For application procedures, students should consult the premedical adviser in their IT department.

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 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 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 other 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, for summa cum laude, an honors thesis. Some departments also require theses for cum laude and magna cum laude degrees.

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

Geo 1001, 1002

Math 1155, 1271-1272*

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.

** 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.

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. That GPA is calculated using the grades of all courses taken, including repeated courses. 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.

Find it



Find a directory of offices and departments for the Institute of Technology on page 264.

Institute of
Technology

Students who graduate from IT but continue to register for courses will automatically have their major changed to adult special (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 Office of the Registrar Service 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).

If a student's infraction involves both IT judicial proceedings and court proceedings, and if an IT decision might prejudice the court case, IT will hold its decision in abeyance until the court proceedings have been concluded.

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).

Center for the Development of Technological Leadership (CDTL)—IT, the Carlson School of Management, College of Liberal Arts, Hubert H. Humphrey Institute of Public Affairs, and College of Agricultural, Food, and Environmental Sciences participate in this interdisciplinary center. It promotes leadership in technology by supporting appropriate

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.

research and providing IT students and technical professionals with educational opportunities for increased breadth and depth in technical management, business, and liberal arts. The center administers the master of science in the management of technology degree program.

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 Center for the Development of Technological Leadership, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55455 (612-624-5747).

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@tc.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. 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).

International Programs

IT students have a number of opportunities for study abroad. Study in English is possible at several sites. Opportunities include the International Student Exchange Program (ISEP), International Association for the Exchange of Students for Technical Experience (IAESTE), and Institute for Study Abroad (Butler University, IN).

Identifying Opportunities—Each IT department has a list of recommended locations for study abroad. Students can learn more about these options by contacting Global Campus, 230 Heller Hall (612-626-9000).

Opportunities in Engineering—The University's student exchanges and consortium memberships give students access to engineering courses at universities in many countries. Courses taught in English are available in Australia, Canada, Denmark, Finland, Hong Kong, Malta, Singapore, Sweden, Tanzania, and the United Kingdom. Students with sufficient language fluency may instead choose to study in Chinese (Hong Kong), Filipino (Philippines), Finnish (Finland), French (Belgium, France), German (Germany), Italian (Italy), Korean (South Korea), Portuguese (Brazil), Spanish (Argentina, Colombia, Costa Rica, Dominican Republic, Mexico), or Thai (Thailand).

Other Information—For more information (e.g., study options, earning credit, financial aid), see "Study Abroad" in the General Information section of this catalog.

Career Information

IT Career Services (ITCS), 50 Lind Hall (612-624-4090), 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.

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 and Triangle.

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 Technologist* (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

1701 University Avenue S.E.
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

125 Mechanical Engineering
625-0705

Physics

148 Tate Laboratory of Physics
624-7375

Statistics

270 Vincent Hall
625-8046

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.

Institute of Technology

Degree Programs

Aerospace Engineering

Department of Aerospace Engineering and Mechanics

B.A.E.M.

Mission—To produce graduates who are prepared to enter and sustain the practice of aerospace engineering or related fields, or to pursue advanced studies.

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 bachelor of aerospace engineering and mechanics (B.A.E.M.) provides this broad background. The program is accredited by the Engineering Accreditation Commission of ABET.

In order to provide graduates with the background required for a profession that will change dramatically during the course of their career, the first objective of the program is to provide a comprehensive engineering education that emphasizes fundamentals in basic sciences, mathematics, and engineering sciences. The second objective of the program is to provide graduates with a knowledge of aerodynamics, aerospace materials, structures, propulsion, flight mechanics, orbital mechanics, and flight control and an understanding of the application of these disciplines to the analysis and design of aerospace vehicles and systems. The final objective of the program is to promote professionalism in students and provide them with the ethical framework to make them cooperative and productive members of society.

A student completing the B.A.E.M. program will acquire the following:

- a solid foundation in mathematics, biology, physics, chemistry, materials science, electrical engineering, and engineering mechanics.
- advanced knowledge in the engineering sciences of fluid mechanics, thermal sciences, dynamical systems, and structural mechanics.
- the ability to design and conduct experiments and analyze and interpret data.
- the ability to design aerospace systems and components in collaboration with others in a professional and ethical manner.
- the ability to identify, formulate, and solve engineering problems.
- a broad understanding of the impact of engineering solutions in a social context as well as a knowledge of contemporary issues and historical perspectives.
- oral and written communication skills.

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 4201—Fluid Mechanics
AEM 4202—Aerodynamics
AEM 4203—Aerospace Propulsion
AEM 4301—Spaceflight Dynamics
AEM 4303—Flight Dynamics and Control
AEM 3031—Deformable Body Mechanics
AEM 4501—Aerospace Structures
One of AEM 4502, AEM 4511, AEM 4581, AEM 5501, or AEM 5503
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
Phys 1301, 1302, 2303—Introductory Physics I, II, III
MatS 2001—Introduction to Science of Engineering Materials
ME 3324—Introduction to Thermal Science
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, 5501, and 5503 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
 - 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 Program

Freshman Year

Fall Semester (16 cr)

Math 1371—IT Calculus I (4 cr)
 Phys 1301—Introductory Physics I (4 cr)
 Chem 1021—Chemical Principles I (4 cr)
 EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (15 cr)

Math 1372—IT Calculus II (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 Biol 1001—Introductory Biology I (4 cr)
 CSCI 1113—Introduction to C/C++ Programming for Scientists and Engineers (4 cr)

Sophomore Year

Fall Semester (17 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
 Phys 2303—Introductory Physics III (4 cr)
 AEM 2011—Statics (3 cr)
 MatS 2001—Introduction to the Science of Engineering Materials (3 cr)
 Liberal education elective (3 cr)

Spring Semester (13 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)
 AEM 2012—Dynamics (3 cr)
 AEM 2301—Mechanics of Flight (3 cr)
 Liberal education elective (3 cr)

Junior Year

Fall Semester (15 cr)

AEM 4201—Fluid Mechanics (4 cr)
 AEM 3031—Deformable Body Mechanics (3 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 4501—Aerospace Structures (3 cr)
 AEM 4303—Flight Dynamics and Control (3 cr)
 AEM 4601—Instrumentation Laboratory (3 cr)
 Liberal education elective (3 cr)

Senior Year

Fall Semester (17 cr)

ME 3324—Introduction to Thermal Science (4 cr)
 AEM 4331—Aerospace Vehicle Design I (3 cr)
 AEM 4602—Aeromechanics Laboratory (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
 Phys 1301, 1302 or Phys 1401, 1402
 Phys 2303 (or 2403), 2201, 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.

Minor Requirements

A minor in astrophysics can be earned through the College of Liberal Arts by taking:

Ast 1001 or 1011

Ast 2001 and its prerequisites

Sample Program

Freshman Year

Fall Semester (16 cr)

Phys 1301—Introductory Physics I (4 cr)

Math 1371—IT Calculus I (4 cr)

Ast 1011—Exploring the Universe (4 cr)

Liberal education elective (4 cr)

Spring Semester (16 cr)

Phys 1302—Introductory Physics II (4 cr)

Math 1372—IT Calculus II (4 cr)

EngC 1011—University Writing and Critical Reading (4 cr)

Liberal education elective (4 cr)

Sophomore Year

Fall Semester (14 cr)

Phys 2303—Introductory Physics III (4 cr)

Phys 2201—Introduction to Thermal and Statistical Physics (2 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)

Liberal education elective (4 cr)

Spring Semester (14 cr)

Phys 2601—Quantum Physics (4 cr)

Phys 2605—Quantum Physics Lab (2 cr)

Math 2374—IT Multivariable Calculus (4 cr)

Ast 2001—Introduction to Astrophysics (4 cr)

Junior Year

Fall Semester (16 cr)

Math 2283—Sequences, Series, and Foundations (4 cr)

Phys 4001—Analytical Mechanics (4 cr)

Ast 4xxx or 5xxx (4 cr)

Degree elective (4 cr)

Spring Semester (12 cr)

Phys 4002—Electricity and Magnetism (4 cr)

Ast 4xxx or 5xxx (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.

Mission—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@tc.umn.edu, <www.bme.umn.edu>).

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.70).

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.

Required Courses

BMEEn 2001—Cell and Molecular Biology of Biomedical Engineers

BMEEn 2101—Biomedical Engineering Undergraduate Seminar I

BMEEn 2102—Biomedical Engineering Undergraduate Seminar II

BMEEn 3001—Biomechanics

BMEEn 3002—Biomedical Transport Processes

BMEEn 3003—Bioelectricity/Bioinstrumentation

BMEEn 3004—Biomaterials

BMEEn 3011—Biomedical Engineering Physiology Laboratory

BMEEn 4001—Biomedical Engineering Design I

BMEEn 4002—Biomedical Engineering Design II

Math 1371—Calculus I

Math 1372—Calculus II

Math 2243—Linear Algebra and Differential Equations

Math 2263—Multivariable Calculus

Stat 3021—Introduction to Probability and Statistics

Phys 1301—Introductory Physics I

Phys 1302—Introductory Physics 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
 Phsl 3061—Principles of Physiology
Electives—24 credits of engineering electives (requires department approval) and 23 credits of liberal education electives (includes Biol 1009)

Sample Program

Freshman Year

Fall Semester (16 cr)

Math 1271—Calculus I (4 cr)
 Phys 1301—Introductory Physics I (4 cr)
 Chem 1021—Chemical Principles I (4 cr)
 EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (16 cr)

Math 1272—Calculus II (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 Chem 1022—Chemical Principles (4 cr)
 Biol 1009—General Biology (4 cr)

Sophomore Year

Fall Semester (15 cr)

Math 2263—Multivariable Calculus (4 cr)
 Chem 2301—Organic Chemistry I (3 cr)
 CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers (3 cr)
 BMEEn 2001—Cell and Molecular Biology for Biomedical Engineers (4 cr)

BMEEn 2101—Biomedical Engineering Undergraduate Seminar I (1 cr)

Spring Semester (17 cr)

Math 2243—Linear Algebra and Differential Equations (4 cr)
 Chem 3501—Physical Chemistry I (3 cr)
 or Biol 3021—Biochemistry (3 cr)
 BMEEn 2102—Biomedical Engineering Undergraduate Seminar II (1 cr)
 Liberal education electives (9 cr)

Junior Year

Fall Semester (15 cr)

BMEEn 3001—Biomechanics (4 cr)
 BMEEn 3002—Biomedical Transport Processes (4 cr)
 Phsl 3061—Principles of Physiology (4 cr)
 Liberal education elective (3 cr)

Spring Semester (16 cr)

BMEEn 3003—Bioelectricity/Bioinstrumentation (4 cr)
 BMEEn 3004—Biomaterials (4 cr)
 BMEEn 3011—Biomedical Engineering Physiology Laboratory (2 cr)
 Stat 3021—Introduction to Probability and Statistics (3 cr)
 Liberal education elective (3 cr)

Senior Year

Fall Semester (15 cr)

BMEEn 4001—Biomedical Engineering Design I (3 cr)
 Engineering electives (12 cr)

Spring Semester (15 cr)

BMEEn 4002—Biomedical Engineering Design II (3 cr)
 Engineering electives (12 cr)

Biosystems and Agricultural Engineering

Department of Biosystems and Agricultural Engineering

B.B.A.E.

Mission—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.

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@tc.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 (3 cr)
 BAE 4023—Instrumentation and Control for Biological Systems (3 cr)

The chemical engineering program was ranked #1 in the nation in the National Research Council's 1995 report.

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

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)
Phys 1301—Introductory Physics I (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)
CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers (3 cr)
Biol 1009—General Biology (4 cr)
AEM 2021—Statics and Dynamics (4 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
CE 3502—Fluid Mechanics (4 cr)
EE 3005—Fundamentals of Electrical Engineering (4 cr)
ME 3324—Introduction to Thermal Science (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, plus liberal education requirements

Sample Program

Freshman Year

Fall Semester (17 cr)

Math 1371—IT Calculus I (4 cr)
Phys 1301—Introductory Physics I (4 cr)
Chem 1021—Chemical Principles I (4 cr)
Rhet 1101—Writing to Inform Convince and Persuade (4 cr)
or EngC 1011—University Writing and Critical Reading (4 cr)
BAE 1011—BAE Orientation (1 cr)

Spring Semester (15 cr)

Math 1372—IT Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Chem 1022—Chemical Principles II (4 cr)
Liberal education elective (3 cr)

Sophomore Year

Fall Semester (15 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
Biol 1009—General Biology (4 cr)
AEM 2021—Statics and Dynamics (4 cr)
BAE 2113—Introduction to Design (3 cr)

Spring Semester (17 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)
CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers (3 cr)
BAE 3013—Engineering Principles of Molecular and Cellular Processes (3 cr)
AEM 3031—Deformable Body Mechanics (3 cr)
Liberal education elective (3 cr)

Junior Year

Fall Semester (16 cr)

BAE 3023—Engineering Principles of Soil-Water-Plant Systems (3 cr)
Stat 3021—Introduction to Probability and Statistics (3 cr)
ME 3324—Introduction to Thermal Science (4 cr)
CE 3502—Fluid Mechanics (4 cr)
Biology elective (3 cr)

Spring Semester (16 cr)

EE 3005—Fundamentals of Electrical Engineering (4 cr)
BAE 4023—Instrumentation and Control for Biological Systems (3 cr)
BAE emphasis (BAE 4313*/4323*, 4523*/4533, or 4713*/4723*) (3 cr)
Engineering elective or BAE emphasis (3 cr)
Rhet 3562—Technical and Professional Writing (3 cr)

Senior Year

Fall Semester (17 cr)

BAE 4112—Senior Design I (2 cr)
BAE 4013—Transport in Biological Systems (3 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 (15 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 (4 cr)
* Offered alternating years

Chemical Engineering

Department of Chemical Engineering and Materials Science B.Ch.E.

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 128 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

- 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
- 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
- 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
- CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers
- MatS 3011—Introduction to Materials Science and Engineering
- Phys 1301—Introductory Physics I
- Phys 1302—Introductory Physics II

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 Program

Freshman Year

Fall Semester (16 cr)

- Chem 1021—General Principles of Chemistry I with Lab (4 cr)
- Math 1371—IT Calculus I (4 cr)
- Phys 1301—Introductory Physics I (4 cr)
- EngC 1011—University Writing and Critical Reading (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 1302—Introductory Physics II (4 cr)
- Liberal education elective #1 (Biol with lab) (4 cr)

Sophomore Year

Fall Semester (16 cr)

- Chem 2301—Organic Chemistry I (3 cr)
- Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
- CSci 1107—Introduction to FORTRAN Programming for Scientists and Engineers (3 cr)

- Liberal education elective #2 (Social Sciences I) (3 cr)
- Liberal education elective #3 (Social Sciences II) (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)
- Liberal education elective #4 (Humanities I) (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 #5 (Literature I) (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)
- Liberal education elective #6 (History I) (3 cr)
- Technical elective (Emphasis I) (3 cr)

Senior Year

Fall Semester (16 cr)

- ChEn 4401—Chemical Engineering Lab I (3 cr)
- ChEn 4501—Chemical Engineering Process Design I (3 cr)
- ChEn 4004—Separation Processes (4 cr)
- MatS 3011—Introduction to the Science of Materials (3 cr)
- Technical elective (Emphasis II) (3 cr)

The solar car built by IT students finished second in the nation in Sunrayce '95 and second in its class in the World Solar Car Rally in Akita, Japan.



Spring Semester (13 cr)

ChEn 4502—Chemical Engineering Process Design II (2 cr)
 ChEn 4601—Process Control (3 cr)
 ChEn 4402—Chemical Engineering Lab II (2 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 2301—Organic Chemistry I (3 cr)
 Chem 2302—Organic Chemistry II (3 cr)
 Chem 2311—Organic Chemistry Lab (3 cr)
 Chem 2101—Analytical Chemistry (3 cr)
 Chem 2111—Analytical Chemistry Lab (2 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—Multivariable Calculus (4 cr)
 Phys 1301—Physics I (4 cr)
 Phys 1302—Physics II (4 cr)

Minor Requirements

A minor is available through the College of Liberal Arts.

Sample Program**Freshman Year****Fall Semester (16 cr)**

Chem 1021—Chemical Principles I (4 cr)
 Math 1371—IT Calculus I (4 cr)
 Phys 1301—Physics I (4 cr)
 EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (16 cr)

Chem 1022—Chemical Principles II (4 cr)
 Math 1372—IT Calculus II (4 cr)
 Phys 1302—Physics II (4 cr)
 Biol 1009—Biology (4 cr)

Sophomore Year**Fall Semester (15 cr)**

Chem 2301—Organic Chemistry I (3 cr)
 Chem 2101—Analytical Chemistry (3 cr)
 Chem 2111—Analytical Chemistry Lab (2 cr)
 Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
 Liberal education elective (3 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 elective (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 elective (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.

Civil engineering deals with the science and art of engineering applied to solving problems related to the human environment and natural resource needs. 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 129 credits to graduate, including 58 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 (14 cr)**

A total of 63 credits are required from other departments, distributed as follows:

Math 1271, 1272, 2243, 2263
 or Math 1371, 1372, 2373, 2374
 or Math 1571H, 1572H, 2573H, 2574H (16 cr)

Phys 1301, 1302 (8 cr)

Chem 1021, 1022 (8 cr)

Geo 1001 (4 cr)

AEM 2011—Statics (3 cr)

AEM 2012—Dynamics (3 cr)*

AEM 3031—Deformable Body Mechanics (3 cr)

Stat 3021—Applied Statistics (3 cr)

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. The following substitutions may be used:

Up to two IT Freshman Seminar courses

One course from another IT department

Final Project

All civil engineering students must complete CE 4102—Capstone Design.

Sample 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)

EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (15-17 cr)

Math 1372—IT Calculus II (4 cr)

Phys 1302—Introductory Physics II (4 cr)

Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)

Liberal education elective (4-6 cr)

Sophomore Year

Fall Semester (16 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)

Chem 1021—Introduction to Chemistry I (4 cr)

AEM 2011—Statics (3 cr)

Stat 3021—Probability and Statistics (3 cr)

CE 3202—Surveying (2 cr)

Spring Semester (17 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)
 Chem 1022—Introduction to Chemistry II (4 cr)
 AEM 3031—Deformable Body Mechanics (3 cr)
 AEM 2012—Dynamics (3 cr)
 CE 3101—Computer Applications in Civil Engineering I (3 cr)

Junior Year**Fall Semester (16-17 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)
 Liberal education elective (3-4 cr)

Spring Semester (17 cr)

CE 3201—Transportation Engineering (3 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)

Senior Year**Fall Semester (14-15 cr)**

CE 4301—Soil Mechanics II (3 cr)
 CE elective (4 cr)
 CE elective (4 cr)
 Liberal education elective (3-4 cr)

Spring Semester (15 cr)

CE 4101—Project Management (3 cr)
 CE 4102—Senior Design (3 cr)
 CE elective (3 cr)
 CE elective (3 cr)
 Liberal education elective (3 cr)

Computer Engineering

*Department of Electrical and Computer Engineering***B.Comp.Eng.**

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 undergraduate CompE 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 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 (currently 2.50).

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; 3 credits of an engineering science elective outside of electrical engineering; 32 credits of required electrical engineering courses; 20 credits of required computer science courses, 22 credits of senior-level technical electives from computer science, electrical engineering, or other IT departments; 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 may use their second and third 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 courses must be C- or better.

Required Courses

EE 2301—Introduction to Digital System Design
 EE 2361—Introduction to Microcontrollers
 EE 2001—Introduction to Electronic and Electrical Circuits
 EE 2002—Introductory Circuits and Electronics Laboratory
 EE 2011—Linear Systems and Circuits
 EE 3115—Analog and Digital Electronics
 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 3601—Transmission Lines
 EE 4951—Senior Design Project
 or EE 4981/4982—Seniors Honors Project
 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
 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
 Engineering science elective (3 cr)

Final Project

All students must take EE 4951—Senior Design Project (2 cr) or the two-semester honors version. Students are organized into teams of approximately five members and design and construct a project under the direction of a faculty member.

Sample 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 (16 cr)

Math 1372—IT Calculus II (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 CSci 1901—Structure of Computer Programming I (4 cr)
 Biology with lab (4 cr)

Sophomore Year

Fall Semester (16 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 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)

Spring Semester (17 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 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)
 Liberal education elective (3 cr)

Junior Year

Fall Semester (15 cr)

EE 3115—Analog and Digital Electronics (4 cr)
 EE 3015—Signals and Systems (3 cr)
 EE 3101—Circuits and Electronics Lab I (2 cr)
 Engineering science elective (3 cr)
 Liberal education elective (3 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 (3 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 4951—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 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 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 (3xxx courses from outside CSci will be allowed if they have a 1xxx or 2xxx prerequisite in the same, or a related, field);
- consists primarily of regular classes; in particular, the upper division option should contain no more than one class numbered CSci 59xx or CSci 4970.

All courses mentioned 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

Minor Requirements

A minor is available through the College of Liberal Arts (CLA); see the CLA B.A. in computer science.

Sample Program

Freshman Year

Fall Semester (15-16 cr)

Math 1371—IT Calculus I (4 cr)

Phys 1301—Introductory Physics I (4 cr)

CSci 1901—Structure of Computer Programming I (4 cr)

Liberal education elective (3 cr)

or EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (15-16 cr)

Math 1372—IT Calculus II (4 cr)

Phys 1302—Introductory Physics II (4 cr)

CSci 1902—Structure of Computer Programming II (4 cr)

Liberal education elective (3 cr)

or EngC 1011 University Writing and Critical Reading (4 cr)

Sophomore Year

Fall Semester (14-15 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)

CSci 2011—Discrete Structures (4 cr)

Stat 3021—Introduction to Probability and Statistics (3 cr)

Liberal education elective (3-4 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 4081—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.

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 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 (currently 2.30).

Degree Requirements

Students must complete at least 126 credits to graduate, including 63 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, 4 credits of an engineering science elective outside of electrical engineering, 35 credits of required electrical engineering courses, 32 credits of senior level technical electives from electrical engineering and other IT departments, 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 industrial assignment credits as non-major 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. Students must complete all required technical courses with a grade of C- or better.

Required Courses

EE 2301—Introduction to Digital System Design

EE 2361—Introduction to Microcontrollers

EE 2001—Introduction to Electronic and Electrical Circuits

EE 2002—Introduction to Circuits and Electronics Laboratory

EE 2011—Linear Systems and Circuits

EE 3115—Analog and Digital Electronics

EE 3161—Semiconductor Devices

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 3601—Transmission Lines

EE 4951—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 1301—Introductory Physics I

Phys 1302—Introductory Physics II

Chem 1021—Chemical Principles I

Chem 1022—Chemical Principles II

or Phys 2303—Introductory Physics III

CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers

Engineering science elective (4 cr)

Electives—4-12 credits of senior technical electives from an approved list of IT courses

Final Project

All students must take EE 4951—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 Program (with second semester of chemistry)

Freshman Year

Fall Semester (16-17 cr)

- Math 1371—IT Calculus I (4 cr)
- Phys 1301—Introductory Physics I (4 cr)
- CSci 1113—Introduction to C/C++ Programming (4 cr)
- EngC 1011—University Writing and Critical Reading (4 cr)
- EE 1001—Introduction to Electrical Engineering (1 cr) (optional)

Spring Semester (16 cr)

- Math 1372—IT Calculus II (4 cr)
- Phys 1302—Introductory Physics II (4 cr)
- Chem 1021—Chemical Principles I (4 cr)
- Biology with lab (4 cr)

Sophomore Year

Fall Semester (16 cr)

- Math 2373—IT Linear Algebra and Differential Equations (4 cr)
- Chem 1022—Chemical Principles II (4 cr)
- EE 2301—Introduction to Digital System Design (4 cr)
- EE 2001—Introduction to Electronic and Electrical Circuits (3 cr)
- EE 2002—Introduction to Circuits and Electronics Lab (1 cr)

Spring Semester (16 cr)

- Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
- EE 2361—Introduction to Microcontrollers (3 cr)
- EE 2011—Linear Systems and Circuits (3 cr)
- Liberal education elective (6 cr)

Junior Year

Fall Semester (16 cr)

- EE 3115—Analog and Digital Electronics (4 cr)
- EE 3015—Signals and Systems (3 cr)
- EE 3101—Circuits and Electronics Lab I (2 cr)
- Engineering science elective (4 cr)
- Liberal education elective (3 cr)

Spring Semester (15 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 elective (16 cr)

Spring Semester (15 cr)

- EE 4951—Senior Design Project (2 cr)
- Senior technical elective (10 cr)
- Liberal education elective (3 cr)

Sample Program (with modern physics)

Freshman Year

Fall Semester (16-17 cr)

- Math 1371—IT Calculus I (4 cr)
- Phys 1301—Introductory Physics I (4 cr)
- CSci 1113—Introduction to C/C++ for Science and Engineering (4 cr)
- EngC 1011—University Writing and Critical Reading (4 cr)
- EE 1001—Introduction to Electrical Engineering (1 cr) (optional)

Spring Semester (16 cr)

- Math 1372—IT Calculus II (4 cr)
- Phys 1302—Introductory Physics II (4 cr)
- Chem 1021—Chemical Principles I (4 cr)
- Biology with lab (4 cr)

Sophomore Year

Fall Semester (16 cr)

- Math 2373—IT Linear Algebra and Differential Equations (4 cr)
- Phys 2303—Introductory Physics III (4 cr)
- EE 2301—Introduction to Digital System Design (4 cr)
- EE 2001—Introduction to Electronic and Electrical Circuits (3 cr)
- EE 2002—Introduction to Circuits and Electronics Lab (1 cr)

Spring Semester (16 cr)

- Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
- EE 2361—Introduction to Microcontrollers (3 cr)
- EE 2011—Linear Systems and Circuits (3 cr)
- Liberal education elective (6 cr)

Junior Year

Fall Semester (16 cr)

- EE 3115—Analog and Digital Electronics (4 cr)
- EE 3015—Signals and Systems (3 cr)
- EE 3101—Circuits and Electronics Lab I (2 cr)
- Engineering science elective (4 cr)
- Liberal education elective (3 cr)

Spring Semester (15 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 elective (16 cr)

Spring Semester (15 cr)

- EE 4951—Senior Design Project (2 cr)
- Senior technical elective (10 cr)
- Liberal education elective (3 cr)



Geological Engineering

Department of Civil Engineering

B.Geo.E.

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
 GeoE 3301—Soil Mechanics I
 CE 3501—Environmental Engineering
 CE 3502—Fluid Mechanics
 GeoE 4102—Capstone Design
 GeoE 4341—Engineering Geostatistics
 GeoE 4351—Groundwater Mechanics
 GeoE 4352—Groundwater Modeling
 CE 4501—Hydrologic Design
 CE 4531—Environmental Process Engineering
 CE 4561—Solid and Hazardous Waste
 GeoE technical electives (6 cr)

Geomechanics Option

CE 3101—Computer Applications I
 GeoE 3301—Soil Mechanics I
 GeoE 3311—Rock Mechanics I
 CE 3502—Fluid Mechanics
 GeoE 4102—Capstone Design
 CE 4121—Computer Applications II
 GeoE 4301—Soil Mechanics II
 GeoE 4311—Rock Mechanics II
 GeoE 4341—Engineering Geostatistics
 CE 4351—Groundwater Mechanics
 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)

Math 1371—IT Calculus I (4 cr)
 Phys 1301—Introductory Physics I (4 cr)
 Biol 1009—General Biology (4 cr)
 EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (15 cr)

Math 1372—IT Calculus II (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 Geo 1001—Introduction to Geology (4 cr)
 Liberal education elective (3 cr)

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Sophomore Year

Fall Semester (17 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
 Chem 1021—Chemical Principles I (4 cr)
 AEM 2011—Statics (3 cr)
 Stat 3021—Probability and Statistics (3 cr)
 Liberal education elective (3 cr)

Spring Semester (17 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)
 Chem 1022—Chemical Principles II (4 cr)
 AEM 3031—Deformable Body Mechanics (3 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)

GeoE 3301—Soil Mechanics I (3 cr)
 CE 4501—Hydrologic Design (4 cr)
 GeoE 4341—Engineering Geostatistics (3 cr)
 Geo 2302—Petrology (3 cr)

Summer Session (3 cr)

Geo 3911—Field Geology (3 cr)

Senior Year

Fall Semester (15 cr)

GeoE 4351—Groundwater Mechanics (3 cr)
 Geo 4203—Principles of Geophysical Exploration (3 cr)
 Geo 4703—Glacial Geology (3 cr)
 CE 4531—Environmental Process Engineering (3 cr)
 GeoE technical elective (3 cr)

Spring Semester (16 cr)

GeoE 4352—Groundwater Modeling (3 cr)
 GeoE 4102—Senior Design (3 cr)
 Geo 4501—Structural Geology (3 cr)
 CE 4561—Solid and Hazardous Waste (4 cr)
 GeoE technical elective (3 cr)

Geomechanics Option

Sample Program

Freshman Year

Fall Semester (16 cr)

Math 1371—IT Calculus I (4 cr)
 Phys 1301—Introductory Physics I (4 cr)
 Biol 1009—General Biology (4 cr)
 EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (15 cr)

Math 1372—IT Calculus II (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 Geo 1001—Introduction to Geology (4 cr)
 Liberal education elective (3 cr)

Sophomore Year

Fall Semester (17 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
 Chem 1021—Chemical Principles I (4 cr)
 AEM 2011—Statics (3 cr)
 Stat 3021—Probability and Statistics (3 cr)
 Liberal education elective (3 cr)

Spring Semester (17 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)
 Chem 1022—Chemical Principles II (4 cr)
 AEM 3031—Deformable Body Mechanics (3 cr)
 AEM 2012—Dynamics (3 cr)
 Liberal education elective (3 cr)

Junior Year

Fall Semester (16 cr)

CE 3101—Computer Applications I (3 cr)
 GeoE 3301—Soil Mechanics I (3 cr)
 CE 3502—Fluid Mechanics (4 cr)
 Geo 2301—Mineralogy (3 cr)
 Liberal education elective (3 cr)

Spring Semester (15 cr)

GeoE 3311—Rock Mechanics I (3 cr)
 GeoE 4341—Engineering Geostatistics (3 cr)
 Geo 2302—Petrology (3 cr)
 CE 4121—Computer Applications II (3 cr)
 Liberal education elective (3 cr)

Summer Session (3 cr)

Geo 3911—Field Geology (3 cr)

Senior Year

Fall Semester (16 cr)

GeoE 4301—Soil Mechanics II (3 cr)
 GeoE 4351—Groundwater Mechanics (3 cr)
 Geo 4203—Principles of Geophysical Exploration (3 cr)
 Geo 4703—Glacial Geology (3 cr)
 Technical elective (GeoE) (4 cr)

Spring Semester (13 cr)

GeoE 4311—Rock Mechanics II (3 cr)
 GeoE 4102—Senior Design (3 cr)
 Geo 4501—Structural Geology (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.

The department offers two tracks within the B.S. Geology degree program: (1) environmental geology and (2) geochemistry. These tracks 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
 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 4921—Field Geophysics
 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

Minor Requirements

Geo 1001 or equivalent and 14 credits of 2xxx (or higher) geology or geophysics courses. Available through the College of Liberal Arts.

Sample Program

Freshman Year

Fall Semester (15 cr)

Math 1371—IT Calculus I (4 cr)
 Phys 1301—Introductory Physics I (4 cr)
 Chem 1021—Principles of Chemistry I (4 cr)
 Liberal education elective (3 cr)

Spring Semester (16 cr)

Math 1372—IT Calculus II (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 Chem 1022—Principles of Chemistry II (4 cr)
 EngC 1011—University Writing and Critical Reading (4 cr)

Sophomore Year

Fall Semester (14 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)
 Geo 2201—Geodynamics I: The Solid Earth (3 cr)
 Geo 2301—Mineralogy (3 cr)
 Biology with lab (4 cr)

Spring Semester (12 cr)

Geo 2303—Geochemical Principles (3 cr)
 Geo 2302—Petrology (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 4501—Structural Geology (3 cr)
 Geo 4602—Sedimentology and Stratigraphy (3 cr)
 Geo 3890—Field Workshop (1 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 4501—Structural Geology
 Geo 3911—Introduction to Field 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 4921—Field Geophysics
 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—9 credits total of appropriate elective courses in physical and natural sciences, engineering, and mathematics, chosen in consultation with a faculty adviser.

Minor Requirements

Geo 1001 or equivalent and 14 credits of 2xxx (or higher) geology or geophysics courses.

Sample Program

Freshman Year

Fall Semester (15 cr)

Math 1371—IT Calculus I (4 cr)
 Phys 1301—Introductory Physics I (4 cr)
 Chem 1021—Principles of Chemistry I (4 cr)
 Liberal education elective (3 cr)

Spring Semester (16 cr)

Math 1372—IT Calculus II (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 Chem 1022—Principles of Chemistry II (4 cr)
 EngC 1011—University Writing and Critical Reading (4 cr)

Sophomore Year

Fall Semester (14 cr)

Math 2373—IT Linear Algebra and Differential Equations (4 cr)
 Phys 2303—Introductory Physics III (4 cr)
 Geo 2201—Geodynamics I: The Solid Earth (3 cr)
 Geo 2301—Mineralogy (3 cr)

Spring Semester (13 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
 Geo 2303—Geochemical Principles (3 cr)
 Geo 2302—Petrology (3 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)
 Geophys elective (3 cr)
 Liberal education elective (3 cr)
 Technical elective (3 cr)

Spring Semester (14 cr)

Geo 4501—Structural Geology (3 cr)
 Geo 3890—Field Workshop (1 cr)
 Geophys 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)

Geophys 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 Phillip Barry or 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:

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)

Spch 3201—Introduction to Electronic Media Production (3 cr)

Spch 3211—Introduction to US Electronic Media (3 cr)

Spch 4231—Comparing Electronic Media Systems (3 cr)

Spch 4235—Electronic Media and Ethnic Minorities, A World View (3 cr)

Spch 4291—New Telecommunication Media (3 cr)

Spch 5233—Electronic Media and National Development (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).

Prerequisites (8 cr)

Econ 1104 and 1105

or Econ 1101 and 1102

An overall GPA of at least 2.80

Admitted to an upper division IT major with at least 60 credits completed

Required Courses

Acct 2050—Principles of Accounting (4 cr)

Acct 3001—Introduction to Management Accounting (2 cr)

Fina 3001—Finance Fundamentals (2 cr)

Mgmt 3001—Fundamentals of Management (2 cr)

Mktg 3001—Principles of Marketing (2 cr)

OMS 3001—Introduction to Operations Management (2 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 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.

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 33 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

MatS 3011—Introduction to Materials Science and Engineering (3 cr)

MatS 3012W—Structure and Mechanical Behavior of Materials (4 cr) (includes lab)

MatS 4001—Thermodynamics of Materials (3 cr)

MatS 4002—Mass Transport and Kinetics (3 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)

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)

Phys 1301—Introductory Physics I (4 cr)

Phys 1302—Introductory Physics II (4 cr)

Phys 2303—Introductory Physics III (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 Program

Freshman Year

Fall Semester (16 cr)

Chem 1021—General Principles I with Lab (4 cr)

Phys 1301—Introductory Physics I (4 cr)

Math 1371—IT Calculus I (4 cr)

EngC 1011—University Writing and Critical Reading (4 cr)

The National
 Research Council
 ranked the
 mathematics
 program #14 in the
 nation.

The mechanical
 engineering
 program was
 ranked #8 in the
 nation in a report
 by the National
 Research Council.

Spring Semester (16 cr)
 Chem 1022—General Principles II with Lab (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 Math 1372—IT Calculus II (4 cr)
 Liberal education elective #1 (Biol and lab) (4 cr)

Sophomore Year

Fall Semester (17 cr)
 Chem 2301—Organic Chemistry I (3 cr)
 Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
 AEM 2011—Statics (3 cr)
 Liberal education elective #2 (Social Sciences I) (3 cr)
 Liberal education elective #3 (Social Sciences II) (3 cr)

Spring Semester (17 cr)
 Math 2373—IT Linear Algebra and Differential Equations (4 cr)
 AEM 3031—Deformable Body Mechanics (3 cr)
 CE 3101—Computer Applications I (3 cr)
 Phys 2303—Introductory Physics III (4 cr)
 Liberal education elective #4 (Humanities I) (3 cr)

Junior Year

Fall Semester (15 cr)
 MatS 3011—Introduction to Materials Science and Engineering (no lab) (3 cr)
 MatS 4001—Thermodynamics of Materials (3 cr)
 Technical elective I (3 cr)
 Technical elective II (3 cr)
 Liberal education elective #5 (Literature I) (3 cr)

Spring Semester (17 cr)
 MatS 3012W—Structure and Mechanical Behavior of Materials (4 cr)
 MatS 4013—Electrical and Magnetic Properties of Materials (3 cr)
 MatS 4002—Kinetics and Mass Transport (3 cr)
 Elective (4 cr)
 Technical elective III (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 IV (4 cr)
 Liberal education elective #6 (History I) (3 cr)

Spring Semester (13 cr)
 MatS 4400—Senior Design (3 cr)
 MatS 4301W—Materials Processing (4 cr)
 AEM 4511—Composite Materials (3 cr)
 Technical elective V (3 cr)

Mathematics

School of Mathematics

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 and preparation for teaching in the secondary school 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 or secondary teaching 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 the honors calculus must also 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 5285—Honors: Fundamental Structures of Algebra I
- Math 5286—Honors: Fundamental Structures of Algebra II
- Math 4242—Applied Linear Algebra
- Math 5248—Cryptology and Number Theory
- Math 5251—Error-Correcting Codes, Finite Fields, Algebraic Curves
- Math 5711—Linear Programming and Combinatorial Optimization
- Math 5385—Introduction to Computational Algebraic Geometry
- Math 5705—Combinatorics A
- or Math 5707 Combinatorics B (but not both)

To satisfy the analysis requirement, students must take two courses from the following:

- Math 5615—Honors: Introduction to Analysis I
- Math 5616—Honors: Introduction to Analysis II
- Math 4606—Advanced Calculus
- Math 5525—Introduction to Ordinary Differential Equations
- Math 5535—Dynamical Systems and Chaos
- Math 5587—Elementary Partial Differential Equations
- Math 5583—Complex Variables
- Math 5651—Basic Theory of Probability and Statistics
- Math 5652—Introduction to Stochastic Processes
- Math 5654—Prediction and Filtering
- Math 5486—Introduction to Numerical Methods II

The School of Mathematics will accept the following courses from other departments as part of the eight-course upper division mathematics requirement:

- CSci 5301—Numerical Analysis
- CSci 5302—Analysis of Numerical Algorithms
- 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.

Note: The following three upper division mathematics courses cannot be used to satisfy part of the eight course upper division math requirement, though they may be used as technical elective:

Math 4457—Methods of Applied Mathematics I

Math 4458—Methods of Applied Mathematics II

Math 4512—Differential Equations With Applications

Math 3113 and Math 3118, Topics in Elementary Mathematics I and II, 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—Introductory Physics 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 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, is a prereq (or a prereq for a prereq);
- 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.

Minor Requirements

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 courses, including at least one in mathematics.

Sample Program

Freshman Year

Fall Semester (15 cr)

Math 1371—IT Calculus I (4 cr)

Phys 1301—Introductory Physics I (4 cr)

EngC 1011—University Writing and Critical Reading (4 cr)

Liberal education elective (3 cr)

Spring Semester (15 cr)

Math 1372—IT Calculus II (4 cr)

Phys 1302—Introductory Physics II (4 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)

Liberal education elective (3 cr)

Sophomore Year

Fall Semester (15 cr)

Math 2273—IT Linear Algebra and Differential Equations (4 cr)

Phys 2303—Introduction to Physics III (4 cr)

Liberal education elective (3 cr)

Biology with lab (4 cr)

Spring Semester (15 cr)

Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)

Math 2283—Sequences, Series, and Foundations (3 cr)

or 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 1 (3-4 cr)

Upper division math 2 (4 cr)

Technical elective 1 (4 cr)

Upper division composition (4 cr)

Spring Semester (16 cr)

Upper division math 3 (4 cr)

Upper division math 4 (4 cr)

Technical elective 2 (4 cr)

Liberal education elective (4 cr)

Senior Year

Fall Semester (15 cr)

Upper division math 5 (4 cr)

Upper division math 6 (4 cr)

Free elective (7 cr)

Spring Semester (15 cr)

Upper division math 7 (4 cr)

Upper division math 8 (4 cr)

Free elective (7 cr)

Mechanical Engineering

Department of Mechanical Engineering

B.M.E.

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.

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.

Further details and information about alternative course selections, elective programs, area of specialization, and changes in course or credit requirements are available in 125 Mechanical Engineering (612-625-5842, e-mail u-gradinfo@me.umn.edu).

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.50).

Find it



The mechanical engineering program educational objectives and outcomes for the baccalaureate degree are presented on the department Web site <www.me.umn.edu>.

*Institute of
Technology*

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 two of which must be ME or IE courses. The other two should be upper division IT courses, though one course may be selected from Phys 2303, Chem 1022, or Math 2283. (Note: the credits required for electives will be 15 if Math 2283 is one of the electives selected.)

Required Courses From Other Programs

- 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)
- Chem 1021—Chemical Principles I (4 cr)
- AEM 2021—Statics and Dynamics (4 cr)
- AEM 3031—Deformable Body Mechanics (3 cr)
- EE 3005—Fundamentals of Electrical Engineering (4 cr) and EE 3006—Lab (1 cr)
- CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers (4 cr)
- MatS 2001 (4 cr)—Introduction to the Science of Engineering Materials (The lab associated with this class is required.)

Liberal education electives (15 cr)

Electives—One of the following may be used as a technical elective: Phys 2303, Chem 1022, or Math 2283.

Sample Program

Freshman Year

Fall Semester (16 cr)

- Math 1371—IT Calculus I (4 cr)
- Phys 1301—Introductory Physics I (4 cr)
- Chem 1021—General Principles of Chemistry I (4 cr)
- EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (15 cr)

- Math 1372—IT Calculus II (4 cr)
- Phys 1302—Introductory Physics II (4 cr)
- Liberal education elective** (3 cr)
- Biology with lab (4 cr)

Sophomore Year

Fall Semester (16 cr)

- Math 2374—IT Multivariable Calculus and Vector Analysis (4 cr)
- AEM 2021—Statics and Dynamics (4 cr)
- CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers (4 cr)
- MatS 2001—Introduction to Mechanical Properties* (4 cr)

Spring Semester (17 cr)

- Math 2373—IT Linear Algebra and Differential Equations (4 cr)
- ME 2011—Introduction to Mechanical Engineering (4 cr)
- AEM 3031—Deformable Body Mechanics (3 cr)
- Liberal education elective** (3 cr)
- Liberal education elective** (3 cr)

Junior Year

Fall Semester (16 cr)

- ME 3221—Design and Manufacturing I (4 cr)
- ME 3321—Thermodynamics (4 cr)
- EE 3005—Fundamentals of Electrical Engineering Lecture (4 cr)
- EE 3006—Fundamentals of Electrical Engineering Lab (1 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 #1 (4 cr)

Senior Year

Fall Semester (16 cr)

- ME 3281—System Dynamics and Controls (4 cr)
- ME 4054—Senior Design (4 cr)
- IE 4521—Statistics, Quality, and Reliability (4 cr)
- Technical elective #2 (4 cr)

Spring Semester (15 cr)

- ME 4x3x—Senior Lab (4 cr)
- Technical elective #3 (4 cr)
- Technical elective #4 (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.

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 must also complete the University's liberal education requirements.

Required Courses

Core Program for all Physics Majors

Phys 1301, 1302, 2303 or Phys 1401, 1402, 2403 (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 4052—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

Additional Requirements (depending on emphasis)

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; adviser approval required)

Engineering Emphasis (35-38 cr)

Chem 1021—Chemical Principles I (4 cr)

Two courses (or indicated substitutes) not already chosen from the list (7 cr):

Phys 4001 or AEM 2021 or AEM 2011-2012

Phys 4002 or EE 3601

Phys 4101

Phys 4201 or ME 3321 or ME 3324

Technical electives (24 cr; 3xxx or higher; adviser approval required)

Biology Emphasis (34-36 cr)

Chem 1021—Chemical Principles I (4 cr)

Chem 1022—Chemical Principles II (4 cr)

Chem 2301—Organic Chemistry I (3 cr)

BioC 3021—Biochemistry (3 cr)

Biol 1009—General Biology (counted in the liberal education requirement)

Two courses (or indicated substitutes) not already chosen from the list (6-8 cr):

Phys 4001

Phys 4002

Phys 4101 or Chem 3501

Phys 4201 or Chem 3502

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

Phys 4711—Introduction to Optics (3 cr)

EE 5621—Physical Optics (4 cr, together with EE 5622—Physical Optics Lab)

Phys 5701—Solid State Physics (4 cr)

AEM 4201—Fluid Mechanics

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.

Electives—19 credits of technical courses from any appropriate department. Technical electives must be approved by a physics adviser.

Minor Requirements

A physics minor is available through the College of Liberal Arts.

Sample Program (Physics Emphasis)

Freshman Year

Fall Semester (15 cr)

Math 1271 or 1371 or 1571H—Calculus I (4 cr)
 Phys 1301 or 1401—Introductory Physics I (4 cr)
 EngC 1011—University Writing and Critical Reading (4 cr)
 Liberal education elective (3 cr)

Spring Semester (15 cr)

Math 1272 or 1372 or 1572H—Calculus II (4 cr)
 Phys 1302 or 1402—Introductory Physics II (4 cr)
 Technical elective (chemistry)* (4 cr)
 Liberal education elective (3 cr)

Sophomore Year

Fall Semester (14 cr)

Math 2243 or 2373 or 2573H—Linear Algebra/Differential Equations (4 cr)
 Phys 2303 or 2403—Introductory Physics III (4 cr)
 Phys 2201—Thermal and Statistical Physics (2 cr)
 Liberal education elective (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 4052—Methods of Experimental Physics II (5 cr)
 Technical elective (math)* (4 cr)
 Liberal education elective (3 cr)

Senior Year

Fall Semester (14 cr)

Phys 4101—Quantum Physics (4 cr)
 Phys 4201—Statistical and Thermal Physics (3 cr)
 Technical elective (waves, optics)* (3 cr)
 Liberal education elective (4 cr)

Spring Semester (15 cr)

Physics or astrophysics elective (4 cr)
 Technical elective (lab project)* (4 cr)
 Liberal education elective (4 cr)
 Open elective (3 cr)

* Recommended for physics students going on to graduate school.

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, Stat 5041, Stat 5201, Stat 5302, Stat 5303, Stat 5401, Stat 5421, Stat 5601
 Math 1271, 1272 or Math 1371, 1372 or Math 1571H, 1572H—Calculus I-II
 Math 2263 or 2374 or 2574H—Multivariable Calculus
 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

Minor Requirements

At least 14 credits from 3xxx-5xxx School of Statistics courses, including at least two 5xxx courses.

Course Descriptions

Accounting (Acct)	290	English: Literature (Engl)	350	Modern Greek (MdGk)	407
Adult Education (AdEd)	291	English: Writing, Rhetoric, and Language (EngC)	352	Mortuary Science (Mort)	408
Aerospace Engineering and Mechanics (AEM)	291	Entomology (Ent)	353	Museum Studies (MSt)	408
Aerospace Studies (Air)	292	Environmental Science (ES)	354	Music (Mus)	408
Afro-American Studies (Afro)	293	Family Education (FE)	354	Music Applied (MusA)	412
Agricultural, Food, and Environmental Education (AFEE)	294	Family Social Science (FSoS)	355	Music Education (MuEd)	413
Agricultural Engineering Technology (AgET)	295	Finance (Fina)	356	Natural Resources and Environmental Studies (NRES)	414
Agricultural Industries and Marketing (AIM)	295	Finnish (Fin)	357	Naval Science (Nav)	415
Agriculture (Agri)	295	Fisheries and Wildlife (FW)	357	Neuroscience (NSc)	416
Agronomy and Plant Genetics (Agro)	296	Food Science and Nutrition (FScN)	358	Neuroscience Department (NSci)	416
Akkadian (Akka)	296	Forest Resources (FR)	359	Norwegian (Nor)	416
American Indian Studies (AmIn)	296	French (Fren)	360	Nursing (Nurs)	417
American Sign Language (ASL)	297	French and Italian (Frit)	362	Operations and Management Science (OMS)	418
American Studies (AmSt)	298	General College (GC)	362	Otolaryngology (Otol)	419
Ancient Near Eastern (ANE)	298	Genetics, Cell Biology, and Development (GCD)	365	Pharmacology (Phcl)	419
Animal Science (AnSc)	299	Geographic Information Science (GIS)	365	Pharmacy Practice (Phar)	419
Anthropology (Anth)	300	Geography (Geog)	365	Philosophy (Phil)	419
Applied Business (ABus)	302	Geological Engineering (GeoE)	368	Physical Education (PE)	421
Applied Economics (ApEc)	303	Geology and Geophysics (Geo)	368	Physical Medicine and Rehabilitation (PMed)	422
Arabic (Arab)	304	German (Ger)	370	Physics (Phys)	423
Aramaic (Arm)	305	German, Scandinavian, and Dutch (GSD)	372	Physiology (Phsl)	425
Architecture (Arch)	305	Gerontology (Gero)	372	Plant Biology (PBio)	425
Art (ArtS)	307	Global Studies (GloS)	372	Plant Pathology (PIPa)	426
Art History (ArtH)	309	Greek (Grk)	373	Polish (Plsh)	426
Astronomy (Ast)	311	Hebrew (Hebr)	374	Political Science (Pol)	426
Biochemistry (BioC)	311	Hindi (Hndi)	375	Portuguese (Port)	429
Biology (Biol)	312	History (Hist)	375	Premajor Advising (PMA)	429
Biomedical Engineering (BMEn)	313	History of Medicine (HMed)	381	Psychology (Psy)	429
Biosystems and Agricultural Engineering (BAE)	314	History of Science and Technology (HSci)	382	Public Affairs (PA)	431
Business Administration (BA)	314	Honors Colloquia (HCol)	383	Public Health (PubH)	434
Business and Industry Education (BIE)	315	Honors Seminar (HSem)	383	Recreation, Park, and Leisure Studies (Rec)	439
Business, Government, and Society (BGS)	316	Horticultural Science (Hort)	383	Religions in Antiquity (RelA)	439
Business Law (BLaw)	316	Human Ecology (HE)	384	Religious Studies (RelS)	441
Cell Biology and Neuroanatomy (CBN)	316	Human Resource Development (HRD)	384	Residential College (RCol)	441
Center for Spirituality and Healing (CSpH)	316	Human Resources and Industrial Relations (HRIR)	385	Rhetoric (Rhet)	441
Central Asian Studies (CAS)	316	Humanities (Hum)	385	Russian (Russ)	442
Chemical Engineering (ChEn)	317	Industrial Engineering (IE)	386	Sanskrit (Skt)	443
Chemistry (Chem)	318	Information and Decision Sciences (IDSc)	387	Scandinavian (Scan)	443
Chicano Studies (Chic)	319	Information Networking (INet)	388	Science in Agriculture (ScAg)	444
Child Psychology (CPsy)	320	Institute of Technology (IoT)	388	Slavic (Slav)	444
Chinese (Chn)	320	Insurance (Ins)	388	Social Work (SW)	444
Civil Engineering (CE)	321	Interdepartmental Study (ID)	388	Sociology (Soc)	445
Classical Civilization (ClCv)	322	Interdisciplinary Archeological Studies (InAr)	389	Soil (Soil)	447
Classics (Clas)	323	Italian (Ital)	389	South Asian Languages and Cultures (SALC)	448
Clinical Laboratory Science (CLS)	324	Japanese (Jpn)	389	Spanish (Span)	449
College of Liberal Arts (CLA)	325	Jewish Studies (JwSt)	390	Spanish-Portuguese (SpPt)	451
College of Veterinary Medicine (CVM)	325	Journalism and Mass Communication (Jour)	391	Speech-Communication (Spch)	452
Communication Disorders (CDIs)	325	Kinesiology (Kin)	392	Sport Studies (SpSt)	453
Comparative Literature (CLit)	326	Korean (Kor)	394	Statistics (Stat)	453
Comparative Studies in Discourse and Society (CSDS)	326	Laboratory Medicine and Pathology (LaMP)	395	Sumerian (Sum)	454
Computer Science (CSci)	326	Landscape Architecture (LA)	395	Swedish (Swed)	454
Construction Management (CMgt)	328	Language, Teaching, and Technology (LgTT)	395	Teaching English as a Second Language (TESL)	454
Coptic (Copt)	329	Latin (Lat)	396	Theatre Arts (Th)	455
Cultural Studies and Comparative Literature (CSCL)	329	Latin American Studies (LAS)	396	Toxicology (Txcl)	456
Curriculum and Instruction (CI)	330	Learning and Academic Skills (LASK)	397	Translation and Interpreting (TrIn)	456
Dance (Dnce)	330	Linguistics (Ling)	397	University College (UC)	456
Danish (Dan)	331	Management (Mgmt)	398	Urban Studies (Urbs)	457
Dental Hygiene (DH)	331	Marathi (Mar)	399	Urdu (Urdu)	457
Design, Housing, and Apparel (DHA)	333	Marketing (Mktg)	399	Veterinary Pathobiology (VPB)	457
Dutch (Dtch)	335	Materials Science (MatS)	399	Water Resources Science (WRS)	457
East Asian Studies (EAS)	335	Mathematics (Math)	400	Women's Studies (WoSt)	457
Ecology, Evolution, and Behavior (EEB)	336	Mechanical Engineering (ME)	403	Wood and Paper Science (WPS)	459
Economics (Econ)	337	Medical Technology (MedT)	405	Work, Community, and Family Education (WCFE)	461
Education and Human Development (EdHD)	340	Medicinal Chemistry (MedC)	405	Youth Development and Research (YoSt)	462
Educational Policy and Administration (EdPA)	340	Medieval Studies (MeSt)	405		
Educational Psychology (EPsy)	342	Microbial Engineering (MicE)	405		
Electrical Engineering (EE)	345	Microbiology (MicB)	406		
Emergency Health Services (EHS)	347	Middle Eastern Languages and Cultures (MELC)	406		
English as a Second Language (ESL)	348	Military Science (Mil)	407		
English: Creative and Professional Writing (EngW) ..	350				



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.

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.

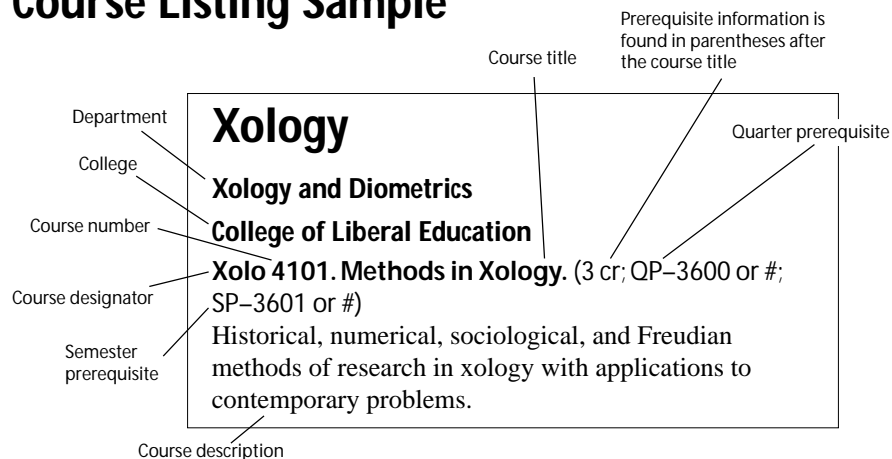
- § Credit will not be granted if credit has been received for the course listed after this symbol.
- ¶ Concurrent registration is required (or allowed) in the course listed after this symbol.
- # Approval of the instructor is required for registration.
- Δ Approval of the department offering the course 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.

Abbreviations

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

- QP Quarter prerequisite. Courses following the QP are quarter courses.
- SP Semester prerequisite. Courses following the SP are semester courses.
- 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.
- UC University College.
- 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.

Course Listing Sample



Find it

The courses in this catalog are current as of April 20, 2000. Check the Catalogs Online Web site at www.umn.edu/compub 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; QP—Completion of 40 credits; SP—Completion of 26 credits; A-F only)
Introduction to financial accounting for U.S. organizations. Reading and understanding U.S. financial statements.

Acct 3001. Introduction to Management Accounting. (2 cr; QP—1050; SP—2050; A-F only)
Introduction to 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; QP—5125, #; SP—5125, #; S-N only)
Full-time work for a public accounting firm plus a written report on the work experience.

Acct 3201. Intermediate Management Accounting. (2 cr; QP—3001, acct or finance major; SP—3001, acct or finance major; A-F only)
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; QP—Acct 3201, #; SP—Acct 3201, #; S-N only)
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; QP—Mgmt student, non-accounting major; SP—Mgmt student, non-accounting major; A-F only)
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. Asset Valuation and Income Determination. (4 cr; QP—Grade of at least B- in 1050, [mgmt major or mgmt grad student]; SP—Grade of at least B- in 2050, [mgmt major or mgmt grad student]; A-F only)
Valuation, measurement, and reporting issues related to selected assets/liabilities of a firm. Theory underlying accounting issues. Applying accounting principles.

Acct 5102. Liability Valuation and Income Determination. (4 cr; QP—3101 or 5101; mgmt or grad mgmt student; SP—5101; mgmt or grad mgmt student; A-F only)
Extends understanding of the basic valuation problems encountered in financial reporting, focusing on the valuation of liabilities. Covers accounting for leases, pensions, deferred taxes. Introduces consolidated financial statements.

Acct 5125. Auditing Principles and Procedures. (4 cr; QP—[3101 or 5101], accounting major; SP—[3101/5101 or 5100/6100], [accounting major or grad mgmt student]; A-F only)
Auditing financial information systems. Independent audits and internal auditing. Ethics. Legal responsibilities.

Acct 5126. Internal Auditing. (2 cr; QP—3101 or 5101; SP—[3101/5101 or 5100/6100], 3001; A-F only)
Financial and operational auditing. Standards. Managing the function.

Acct 5135. Fundamentals of Federal Income Tax. (4 cr; QP—1050 or 8030 or 8130, mgmt or grad student; SP—2050 or 8030 or 8130, mgmt or grad mgmt student; A-F only)
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; QP—MBT student; 1050; SP—MBT student; 2050; A-F only)
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; QP—[3101 or 5100 or 5101], [accounting or finance major]; SP—[5100/6100 or 3101/5101], [accounting or finance major]; A-F only)
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; QP—5102, mgmt or mgmt grad student; SP—5102, mgmt or mgmt grad student; A-F only)
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; QP—MBT student; 5135; SP—MBT student; 5135; A-F only)
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; QP—MBT student; 5135; SP—MBT student; 5135; A-F only)
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; QP—MBT student; 5135; SP—MBT student; 5135; A-F only)
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; QP—5135, acct major; SP—5135, acct major; A-F only)
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; SP—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; QP—5102, mgmt or grad mgmt student; SP—5102, mgmt or grad mgmt student; A-F only)
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; QP—1050, mgmt student; SP—2050, mgmt student; A-F only)
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; QP—5102, acct major; SP—5102, acct major; A-F only)
Topics vary.

Acct 5325. Advanced Tax Principles. (2 cr; QP—5135, MBT student; SP—5135, MBT student; A-F only)
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; SP—5230, MBT student; A-F only)
Corporate readjustments related to multiple corporations and consolidated returns.

Acct 5333. Tax Aspects of Consolidated Returns. (2 cr; SP—5230, MBT student; A-F only)
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; SP—5230, MBT student; A-F only)
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; QP—5135, MBT student; SP—5135, MBT student; A-F only)
Reviews tax consequences associated with formation, operation, and dissolution of a partnership.

Acct 5350. Taxation of Estates and Gifts. (2 cr; QP—5135, MBT student; SP—5135, MBT student; A-F only)
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; QP—5135, MBT student; SP—5135, MBT student; A-F only)
Addresses various topics related to planning the transfer of property during lifetime and at death.

Acct 5353. Income Taxation of Fiduciaries. (2 cr; QP—5135, MBT student; SP—5135, MBT student; A-F only)
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; QP—5135, MBT student; SP—5135, MBT student; A-F only)
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; QP—5135, MBT student; SP—5135, MBT student; A-F only)
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; QP—5135, MBT student; SP—5135, MBT student; A-F only)
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; SP-5230, MBT student; A-F only)
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; SP-5380, MBT student; A-F only)
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; QP-MBT student; SP-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; QP-5135, MBT student; SP-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 5001W. 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;

SP-HRD 5001)

Theory of managing and consulting in human resource development and adult education. Assessment of role requirements and experimentation with practical management and consultation processes and 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; QP-IT student, Phys 1251 or equiv, Math 3252; SP-IT student, Phys 1301 or equiv, ¶Math 2263; A-F only)

Force and moment vectors, resultants. Principles of statics. Applications to simple trusses, frames, and machines. Distributed loads. Hydrostatics. Properties of areas, second moments, and Mohr's circle. Laws of friction.

AEM 2012. Dynamics. (3 cr; QP-IT student, 1015, Math 3261; SP-IT student, 2011, ¶Math 2243; A-F only)

Review of particle dynamics. Mechanical systems and rigid-body dynamics. Kinematics and dynamics of plane systems. Rotating coordinate systems in 2-D. Energy and momentum of 2-D bodies and systems. Vibrations.

AEM 2021. Statics and Dynamics. (4 cr; QP-IT student, Phys 1251 or equiv, Math 3252, Math 3261; SP-IT student, Phys 1301 or equiv, ¶Math 2263; A-F only)

Force and moment vectors, resultants. Principles of statics. Applications to simple trusses, frames, and machines. Distributed loads. Properties of areas. Laws of friction. Review of particle dynamics. Mechanical systems and rigid-body dynamics. Kinematics and dynamics of plane systems. Energy and momentum of 2-D bodies and systems.

AEM 2301. Mechanics of Flight. (3 cr; QP-IT student, Math 1261, Phys 1252 or Δ; SP-IT student, Math 1272, Phys 1301; A-F only)

Standard atmospheric properties; basic aerodynamics; generation of lift and drag; airfoils and finite wings; elements of airplane performance, design and atmospheric flight mechanics; wind tunnel experiments; experimental determination of lift and drag. Introduction to MatLab.

AEM 3031. Deformable Body Mechanics. (3 cr; QP-IT student, 1015, Math 3252, Math 3261 or equiv; SP-IT student, 2011 or 2021, Math 2263 or equiv, ¶Math 2243; A-F only)

Uniaxial loading and deformation. Stress and strain at a point. Forces and moments. Material behavior, linear elasticity. Torsion. Bending of beams of symmetrical section. Euler buckling.

AEM 4001. Workshop: Elementary and Secondary Teachers. (3 cr; QP-Education major, in-service teacher [documentation required], Δ; limited to 30 students; SP-Education major, in-service teacher [documentation required], Δ; limited to 30 students)

Lectures, film reviews, construction and demonstration of classroom aids, involvement with the NASA spacemobile, flight experience, field trips covering topics such as satellites and probes, model rocketry including a launch, astronaut in space, principles of flight, conventional aircraft, space age education tools. Visits to local aerospace facility and to major aerospace installation (subject to availability of airlift).

AEM 4002. Advanced Aerospace Workshop. (3 cr; QP-Education major, in-service secondary teacher in math or science or aerospace [documentation required] or 5001 or #. Δ; SP-Education major, in-service secondary teacher in math or science or aerospace [documentation required] or 4001 or #. Δ)

Advanced workshop for secondary math, science, and aerospace teachers. Uses contemporary NASA design projects to provide new teaching tools to stimulate student interest in math and physics.

AEM 4201. Fluid Mechanics. (4 cr; QP-IT upper div or graduate student, 3036, Math 3252, Math 3261 or Δ; SP-IT upper div or grad, 2012, Math 2243, Math 2263; A-F only)

First course in fluid mechanics. Includes stress and strain rate descriptions, fluid statics, use of differential and finite control volume analysis with continuity, momentum and energy equations, Bernoulli and 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; QP-Upper div IT or grad, 5200 or Δ; SP-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; QP-IT upper div or grad, 5204, ME 3301 or Δ; SP-IT upper div or grad, 4202, ME 3324)

Basic one-dimensional flows: isentropic, area change, heat addition. Overall performance characteristics of propellers, ramjets, turbojets, turbopumps, rockets. Performance analysis of inlets and exhaust nozzles, compressors, burners, turbines. Rocket flight performance, single- and multi-stage chemical rockets, liquid and solid propellants. Homework includes design problems. Design project with technical report.

AEM 4243. Advanced Aerodynamics. (3 cr; QP-IT upper div or grad, 5206 or Δ; SP-IT upper div or grad, 4202)

Interaction between pressure distribution and boundary-layer growth on air foils of arbitrary shape. Inviscid flow past non-planar wings of specified planform.

Course Descriptions

AEM 4245. Hypersonic Aerodynamics. (3 cr; QP–Upper div IT or grad, 5204 or Δ; SP–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; QP–IT upper div or grad, 5200 or equiv, CSci 3101 or equiv, Δ; SP–IT upper div or grad, 4201 or equiv, CSci 1107 or equiv)

Introduction to computational fluid mechanics with emphasis on finite element method, fundamentals of spatial discretization, numerical time-integration. Introduction to engineering and scientific computing environment and large-scale computing.

AEM 4295. Problems in Fluid Mechanics. (1-3 cr [max 6 cr]; QP–Δ; SP–Δ) Topics of current interest. Individual projects with consent of faculty sponsor.

AEM 4301. Spaceflight Dynamics. (3 cr; QP–IT upper div or grad, 3036, Math 3261, or equiv or Δ; SP–IT upper div or grad, 2012, Math 2243 or equiv) The 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; QP–IT upper div or grad, 3005, or #; SP–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; QP–IT upper div or grad, 3401 or equiv, Δ; SP–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; QP–AEM sr, 3005 or #; SP–AEM sr, 2301 or #)

Students work in teams to design aerospace vehicle: mission requirements, trade studies, sizing/weight estimates, CAD/vehicle integration, performance, propulsion, systems/equipment, operating envelopes, stability/control, specification, certification/ethics. Written report, oral presentation.

AEM 4332W. Aerospace Vehicle Design II. (4 cr; QP–5329 or #, [EngC 1011 or equiv]; SP–[4331 or #], [EngC 1011 or equiv])

Student teams design aerospace vehicle: schedules/milestones/critical-path, trade studies, weight/balance, propulsion, trajectory analysis/controls, CAD/vehicle integration, drawings/specifications, fabrication with CAD/CAM, test matrix, structural analysis/test, stress/strain/displacement measurements, wind tunnel/water channel test, flight test, certification/ethics. Status/written report, oral presentation. Writing-intensive.

AEM 4351. Aerodynamic Decelerator Systems. (3 cr; QP–IT upper div or grad, 3036, 5300 or #; SP–IT upper div or grad, 2012, 2301)

Parachutes and other aerodynamic decelerators. Types, characteristics, applications; drag coefficients and steady descent; stability, deployment, opening forces; apparent mass effects; trajectory analysis; stress analysis; engineering properties of textile materials. Design projects.

AEM 4371. Helicopter Aerodynamics. (3 cr; QP–IT upper div or grad, 5206 or #; SP–IT upper div or grad, 4202)

Review basic aerodynamics, unique features of helicopters, momentum theory in axial flight and rotor flow states, momentum theory in non-axial flight, blade-element theory, simple rotor control, vortex theory. Design project.

AEM 4441. Structural Dynamics. (3 cr; QP–IT upper div or grad, 3401, 3016 or #; SP–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]; QP–Δ; SP–Δ) Topics of Current interest. Individual projects with consent of faculty sponsor.

AEM 4501. Aerospace Structures. (3 cr; QP–IT upper div or grad, 3016 or equiv or #; SP–IT upper div or grad, 3031 or equiv; A-F only)

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; QP–IT upper div or grad, C or better in 5515 or #; SP–IT upper div or grad, C or better in 4501 or #)

Use of computer programs for both microcomputers and workstation computers to solve moderately sized problems of analysis and design of trusses, plane frames, torsion, plane stress, combination structures; elastic and inelastic analysis; use of symmetry and superposition to extend power of prepared programs; basis of the finite element methods used.

AEM 4511. Mechanics of Composite Materials. (3 cr; QP–IT upper div or grad, 3016 or #; SP–IT upper div or grad, 3031.)

Analysis, design, applications of laminated and chopped fiber reinforced composites; micro- and macro-mechanical analysis of elastic constants; failure and environmental degradation.

AEM 4581. Mechanics of Solids. (3 cr; QP–IT upper div or grad, 3016, Math 3252, Math 3261 or #; SP–IT upper div or grad, 3031, Math 2263, Math 2243)

Introduction to continuum mechanics in one space dimension. Kinematics, balances of mass, momentum and energy, jump conditions, constitutive theory. Applications include linear and nonlinear elasticity; elastic wave propagation in bars; Euler buckling; calculus of variations, heat conduction in bars.

AEM 4595. Problems in Mechanics and Materials. (1-3 cr [max 6 cr]; QP–Δ; SP–Δ)

Topics of current interest. Individual projects with consent of faculty sponsor.

AEM 4601. Instrumentation Laboratory. (3 cr; QP–IT upper div or grad, EE 3005, EE 3006, EE 3009, CSci 3101 or #; SP–IT upper div or grad, EE 3005, EE 3006, CSci 1107)

Introduction to lab instrumentation; computerized data acquisition; statistical analysis of data; time series data and spectral analysis; transducers for measurement of solid, fluid, dynamical quantities. Design of experiments.

AEM 4602W. Aeromechanics Laboratory. (4 cr; QP–[IT upper div or grad], 5200, 5515, [EngC 1011 or equiv] or #; SP–[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; QP–IT upper div or grad, 3401, 5206 or #; SP–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 4681. Introduction to Acoustics. (3 cr; QP–Phys 3254, Math 3252, IT upper div or grad student or #; SP–Phys 2303, Math 2263, IT upper div or grad student) Derivation of the wave equation, plane wave solution, transmission and reflection at boundaries, resonators and mufflers, three dimensional wave propagation, properties of environmental noise sources, hearing and perception of sound, acoustic properties of rooms, lab experience in sound and noise measurements, noise control techniques.

AEM 4796. Summer Engineering Employment. (1-3 cr [max 6 cr]; QP–IT upper div, AEM major, written proposal, Δ; SP–IT upper div, AEM major, written proposal, Δ) Summer work (at least 360 hours per summer) with a substantial engineering experience. Written report.

AEM 4821. Aerospace Engineering and Mechanics Honors Thesis I. (3 cr; QP–Upper div AEM honors student, Δ; SP–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; QP–Upper div AEM honors student, Δ; SP–Upper div AEM honors student, Δ) Individual projects under the direction of AEM faculty member.

AEM 4896. Industrial Assignment. (2 cr [max 8 cr]; QP–IT Upper Div, AEM major, Regis in AEM Internship Program, Δ; SP–IT Upper Div, AEM major, Regis in AEM Internship Program, Δ) Engineering internship in industry. Technical report.

AEM 5401. Intermediate Dynamics. (3 cr; QP–IT upper div or grad, 3036, Math 3261; SP–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; QP–IT upper div or grad, AEM 3016, Math 3261, or #; SP–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; QP–IT upper div or grad, 5515 or equiv, Math 3252 or #; SP–4501 or equiv, Math 2263 or equiv or #; A-F only)

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) Student Development

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 AFOTC 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; SP-3301 recommended; A-F only)
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.

Afro-American Studies (Afro)

Department of Afro-American 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; SP-1221 or equiv)
Continuation of skill development from 1221.

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)
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)
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; SP-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; SP-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. (3 cr)
Interdisciplinary study of the experience of African American women, including economic, political, and social factors, psycho-sexual development, and family roles.

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 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 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 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; QP-Jour majors must have course approved on program plan; pre-jour should not enroll; SP-Jour majors must have course approved on program plan; pre-jour should not enroll; A-F only)
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 to Reconstruction. (3 cr)
Importance of the dynamics of class, gender, region, and political ideology, as well as the changing nature of race and racism.

Afro 3865. African American History Survey: 1890 to Present. (4 cr; SP-\$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])
Introduction to literature/cultures of women of African descent writing from Europe, Africa, the Caribbean, the United States. Migration, postcolonial debates, race, class/gender. Readings may include works by Grace Nichols, Jamaica Kincaid, Michelle Cliff, Alice Walker, Mariamba Ba.

Afro 3991. Senior Thesis Preparation in Afro-American and African Studies. (1.5 cr; SP-Completed composition requirement; A-F only)
Senior thesis/project. Development of bibliography and thesis statement.

Afro 3992. Senior Thesis/Project. (1.5 cr; SP-3991)
Research and writing of a draft and final senior thesis in Afro-American and African studies.

Afro 3993. Directed Study. (1-3 cr; SP-#, A, □)
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; QP-Sr or grad or #; SP-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.

Course Descriptions

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)
Ideological, political, religious, and cultural ties that have informed African American and black South African relations from late-18th century to the present.

Afro 5301. The African Novel. (3 cr; SP-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; SP-Major or minor, #)
Supervised field study/internship focused on Afro-American and/or African culture(s), language(s), and 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; QP-Jour major or minor, Jour 3004, A; SP-Jour major or minor, Jour 3004, A; A-F only)
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; SP-#)
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; SP-#)
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; SP-#)
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]; SP-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 5111. 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. (4 cr)
Development of community school program in agriculture, agribusiness, and environmental science that meet graduation outcomes and determine student needs. Use classroom, FFA, and supervised agricultural experiences to develop activities.

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 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; QP–Math 1031 or Math 1142 or equiv, 5 cr phys or chem; SP–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; QP–#; SP–#)
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 Health Issues in Agricultural Work Environments. (2 cr; QP–Jr or sr or grad in IT or COAFES or PubH or other major with interest in occupational and environmental health and safety; SP–Jr or sr or grad in IT or COAFES or PubH or other major with interest in occupational and environmental health and safety)
Examine emerging agricultural occupational safety and health issues including injury, work-related disease, pesticide exposure, pollution, biotechnology, and social implications of changing demographics and technologies.

AgET 5999. Special Workshop in Biosystems and Agricultural Engineering. (1-4 cr; QP–#; SP–#)
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 1000. Honors Colloquium. (2 cr [max 8 cr]; QP–Admission to COAFES honors program or #; SP–Admission to COAFES honors program or #; A-F only)
Colloquia introduce a topic related to contemporary agricultural currents and are designed for all COAFES majors. Topics change each semester, contact college office for topics.

Agri 1001. Freshmen Seminar for Agricultural, Food, and Environmental Sciences. (1-2 cr)
Topics related to agricultural, food, and environmental sciences.

Agri 1901. Topics: Freshman Seminar. (1-3 cr; QP–Fr with no more than 48 cr; SP–Fr with no more than 36 cr; A-F only)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

Agri 1910. Topics: Freshman Seminar. (1-3 cr; QP–Fr with no more than 48 cr; SP–Fr with no more than 36 cr; A-F only)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

Agri 1910W. Topics: Freshman Seminar. (1-3 cr; QP–Fr with no more than 48 cr; SP–Fr with no more than 36 cr; A-F only)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

Agri 3000. Seminar in International Agriculture. (1-4 cr [max 8 cr]; QP–#; SP–#; A-F only)
Oral presentations, discussion of students' research papers. Literature review of selected topics. Discussions with students/staff about their experiences in international agriculture.

Agri 3101. Honors Experience. (2 cr [max 2 cr]; QP–Approved by COAFES honors program committee; SP–Approved by COAFES honors program committee; A-F only)
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]; QP–#; SP–#; A-F only)
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]; QP-5 cr in agronomy, #; SP-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 2103. Grain Grading and Crop Utilization. (1 cr [max 1 cr]; SP-1[ApEc 3411 recommended])
Practice and principles of grain grading. Determining grading factors using Federal Grain Inspection Standards (FGIS) and understanding their importance in market value and end use. Lab only.

Agro 2105. Seed Technology. (1 cr; SP-1103)
Principles and practices of crop and weed seed identification, seed analysis, seed laws, seed handling, conditioning and viability testing. Appropriate for students interested in careers in the seed production or regulation industries.

Agro 2501. Weed Biology and Systematics. (2 cr; QP-Biol 1009 or equiv; SP-Biol 1009 or equiv)
Identification of plant families and individual species of agricultural importance; major emphasis on characteristics of weed species, life cycles, and ecology.

Agro 3003. Introduction to Integrated Weed Management. (1 cr [max 1 cr]; QP-[Biol 1009 or equiv], 1[Ent 3001, 1[PIPa 3002; SP-Biol 1009 or equiv])
Introduction to principles of biological, physical, and agricultural sciences that underlie practice of integrated weed management.

Agro 3005. Applied Crop Physiology and Development. (2 cr [max 2 cr]; QP-[Chem 1001 or Chem 1051 or equiv], 8 cr of biol; SP-1[Biol 3002, [Chem 1011 or Chem 1021 or equiv], 8 cr in [biol or plant science])
Applications of plant physiology to growth, development, and management of field crops. Effects of environment, management practices, plant morphology, and anatomy on physiological processes. Emphasizes inquiry, group activities.

Agro 3203W. Environment, Global Food Production, and the Citizen. (3 cr; QP-\$AnPI 3010; Biol 1009 or equiv; SP-\$AnSc 3203; 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 4093. Directed Studies for Advanced Students. (1-4 cr [max 12 cr]; QP-20 cr in agronomy, #; SP-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]; QP-COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; SP-COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; S-N only)
Supervised professional experience in agribusiness firms or government agencies; evaluative reports and consultations with faculty advisers and employers.

Agro 4101. Experiment Design/Plot Techniques. (3 cr; QP-Jr or sr; SP-Jr or sr)
Principles of field plot techniques and design applied to field demonstrations and experiments. Inductive/deductive reasoning, analysis of data, tests of significance, treatment comparisons.

Agro 4103. World Food Problems. (3 cr; QP-\$ApEc 5790, \$CAPS 5280, \$FScN 5643, jr or sr or grad; SP-\$ApEc 4103, \$CAPS 4103, \$FScN 4103; 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; QP-15 cr of biol and/or plant science; SP-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 4305. Crop Harvest, Storage, Processing, Utilization. (3 cr; QP-Biol 1009, Chem 1001 or Chem 1051 or equiv; SP-1103, Biol 1009; AgET 3213, PIPa 3001, Ent 2001 recommended)
Crop quality traits associated with use and influence on crop harvest, product quality, storage, handling, processing, and utilization. Principles and technology used in crop storage to minimize damage from fungi and insects, and maximize crop quality. Lecture and lab.

Agro 4401. Plant Genetics and Breeding. (4 cr; QP-[Biol 1009 or equiv], grad student, #; SP-\$Hort 4401; [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. Integrated Weed Management. (4 cr; QP-3020, Soil 3125, PBio 3131 or #; SP-3005, PBio 3002, Soil 2125)
Principles of weed management and use of coordinated control tactics including chemical, biological, and cultural means. Appropriate strategies attempt to optimize control methods in terms of economic, environmental, and social impacts.

Agro 4603. Field Crop Scouting and Problem Diagnosis. (2 cr; QP-[Intro courses in Agro, Ent, PIPa, Soil], [jr or sr]; SP-3005, Ent 3001, PIPa 2002, Soil 3416, [jr or sr with 16-20 cr in major])
Field based, hands-on problem solving. Diagnostic strategies. Updates about crops/crop problems in Minnesota. Part of intensive summer workshop at selected Minnesota Agricultural Experiment Stations. Extra course fees.

Agro 4605. Management Technologies for Crop Production. (3 cr; QP-Jr or sr or grad with program committee approval; SP-Jr or sr or grad with program committee approval)
Lectures, discussions, and problem situations address solutions to crop management needs in various climatic zones and soil types in Minnesota. Focus on corn/soybean, small grain, and forage cropping systems. Emphasis on long-term productivity, profitability, and sustainability.

Agro 4660. Senior Capstone. (2 cr; QP-5000 or ScAg 5009 or #; SP-4096 or ScAg 4009 or #)
Problems and decision-centered cases focus on experience from ethical, technical, societal, and personal perspectives. Linked to undergraduate internship and to other experiential learning opportunities.

Agro 4888. Issues in Sustainable Agriculture. (2 cr; QP-[1010, Soil 1020] or 3125 or equiv; SP-[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; QP-[GCB 3022 or equiv], background in plant science; SP-[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 5310. Research Methods in Crop Improvement and Production. (1 cr; QP-Agro or Hort or PIBr grad; SP-Applied Plant Sciences grad; S-N only)
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; QP-\$Ent 5321; [3xxx or above] course in [Agro or AnSc or Ent or Hort or PIPa or Soil] or #; SP-\$Ent 5321; [3xxx or above] course in [Agro or AnSc or Ent or Hort or PIPa or Soil] or #; A-F only)
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; QP-Jr or sr; SP-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; SP-Adv undergrads with # or grad)
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; SP-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]; SP-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)
Colonial experiences of selected indigenous peoples in Americas, Euroasia, Pacific Rim.

AmIn 1101. Beginning Ojibwe I. (4 cr)
Acquisition of speaking skills, fundamentals of grammar, and writing systems.

AmIn 1102. Beginning Ojibwe II. (4 cr; SP-1101)
Acquisition of speaking skills, fundamentals of grammar, and writing systems.

Amln 1121. Beginning Dakota I. (4 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.

Amln 1122. Beginning Dakota II. (4 cr; SP-1121)

Further development of language acquisition skills with oral drills and in-class participation focused on questions and answers.

Amln 3103. Intermediate Ojibwe I. (4 cr; SP-1101, 1102)

Improving speaking skills; grammatical structures; storytelling, oral history, and translation projects.

Amln 3104. Intermediate Ojibwe II. (4 cr; SP-1101, 1102, 3103)

Improving speaking skills; grammatical structure; storytelling, oral history, and translation projects.

Amln 3123. Intermediate Dakota I. (4 cr; SP-1122)

Development of listening, speaking, reading, and writing skills with oral drills and in class participation focused on questions and answers.

Amln 3124. Intermediate Dakota II. (4 cr; SP-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.

Amln 3201W. American Indian Literature. (3 cr)

Comparative studies of oral traditions, modern literature from various tribal cultures.

Amln 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.

Amln 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.

Amln 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.

Amln 3501. American Indian Tribal Governments and Politics. (3 cr; A-F only)

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.

Amln 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.

Amln 3711. Dakota Culture and History. (3 cr)

An overview of Dakota culture, language, history, literature, contemporary issues, and the arts.

Amln 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.

Amln 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.

Amln 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.

Amln 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.

Amln 4201. Topics in American Indian Literature. (3 cr)

Topics organized around issues of theme or genre or region or tribe or gender.

Amln 4231. The Color of Public Policy: African Americans, American Indians, and Chicanos in the United States. (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.

Amln 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.

Amln 4501. Law, Sovereignty, and Treaty Rights. (3 cr; SP-1001)

History of American Indian law and the post-contact effects of colonial and U.S. law on American Indians through the 20th century.

Amln 4511. American Indian Political Economy. (3 cr; OP-1771; SP-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.

Amln 4515. Contemporary American Indian Movements. (3 cr; SP-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.

Amln 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.

Amln 4721. 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 Euroamericans.

Amln 4990. Topics in American Indian Studies: The Black Hills in American Indian History. (3-4 cr [max 3 cr])

Each student chooses tribe (e.g., Lakota, Cheyenne, Arapaho, Arikara, Kiowa, Apache, Shoshone, Hidista, Crow) with known historical association to Black Hills and builds a documentary record of that association based on ethnographic/historic sources. Students assemble bibliography, documentary record of association and write a paper summarizing their findings.

Amln 4991. Independent Study. (1-12 cr [max 18 cr]; SP-#, Δ, □)

Individually arranged research with faculty to meet student needs and interests.

Amln 4996. Field Study. (1-12 cr [max 18 cr]; OP-#, Δ, □; SP-#, Δ, □)

Opportunities for experiential learning in a variety of American Indian community settings. Consult department faculty at least one term before enrolling.

Amln 5890. Problems in American Indian History. (3 cr; SP-#)

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.

Amln 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; OP-EPsy 1601 or #; SP-1701 or #)

Increased communication skill in American Sign Language (ASL); cultural values and behavioral rules of the deaf community in the United States; 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; OP-EPsy 1603 or #; SP-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; OP-EPsy 3601 or #; SP-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]; OP-Fluency in ASL or #; SP-Fluency in ASL, #; S-N only)

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 1001V. Honors: Literature, Power, and the American Peoples to 1900. (4 cr; SP-\$1001W, Honors)
Interdisciplinary study of American society from precontact to industrialization. American literature, art, music, and popular culture in historical context.

AmSt 1001W. Literature, Power, and the American Peoples: to 1900. (4 cr)
Interdisciplinary study of American society from precontact to industrialization. American literature, art, music, and popular culture in historical context.

AmSt 1002W. Music, Movies, and the American Peoples in the 20th Century. (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 1908W. Freshman Seminar. (3 cr; SP-Fr or no more than 36 cr; A-F only)
Topics specified in *Class Schedule*.

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; A-F only)
The study of some of the diverse cultural (racial, ethnic, class) groups in America; institutions and processes that shape their relations and create domination, resistance, hybridity, nationalism, racism, and alliance. Specific content may vary.

AmSt 3114. America in International Perspective. (3 cr; A-F only)
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. (3 cr; A-F only)
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. (3 cr; A-F only)
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; SP-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; SP-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; SP-Jr or sr)
Topics specified in *Class Schedule*.

AmSt 3993. Directed Studies. (1-9 cr [max 9 cr]; SP-#)
Guided individual reading or study.

AmSt 4101W. 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; SP-#)
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 cr [max 9 cr]; SP-#)
Topics as 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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-ANE major, 3 xxx 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 5501. Ancient Israel: The Origins of Israel in Biblical Traditions. (3 cr; SP-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; SP-\$3502, \$RelA 3502, \$RelA 5502; 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; SP-Knowledge of Hebrew not required)
Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion, and historiography. Relationship to surrounding religious systems.

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; SP–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; SP–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; SP–#, 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; QP–#; SP–#)
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; QP–1120 recommended, soph or jr or sr or #; SP–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. (2 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; QP–\$Stat 3011, \$Agro 3060, \$5021; Math 1031 or higher; SP–\$Stat 3011, \$Agro 4104, \$5021; Math 1031 or higher)
Descriptive statistics. Elementary probability. Correlation. Regression. ANOVA. Statistics as applied to livestock.

AnSc 2301. Systemic Physiology. (4 cr; QP–Biol 1009 or equiv; SP–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; QP–Chem 1002 or Chem 3301; SP–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; SP–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; QP–1110 or #; SP–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; QP–3130 or #; SP–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; QP–1143, #; SP–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; QP–Biol 1009 or equiv; SP–\$Agro 3203; Biol 1009 or equiv)
Ecological and ethical concerns of food production systems in global agriculture—past, present, and future. Examine underlying ethical positions about how agroecosystems should be configured. Interactive learning utilizes decision cases, discussions, videos, and other media.

AnSc 3221. Animal Breeding. (4 cr; QP–GCB 3022 recommended)
Application of qualitative and quantitative genetics to animal breeding. Concepts of livestock improvement through selection and mating programs.

AnSc 3305. Reproduction, Artificial Insemination, and Lactation. (4 cr; QP–3301; SP–Biol 1009 or equiv)
Reproductive organ functions, fertilization, estrous cycle and endocrine control, reproductive efficiency, and problems and principles of artificial insemination. Anatomy, physiology, and biochemistry of mammary gland. Mammary growth, initiation, and maintenance of lactation, milk synthesis, and factors influencing lactation curve.

AnSc 3307. Artificial Insemination Techniques. (1 cr; QP–3305 recommended, #; SP–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; QP–3301; SP–2301)
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; QP–3220; SP–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; QP–#; SP–#)

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; QP–#; SP–#)
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]; QP–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; SP–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; S-N only)

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; QP–3401, 3510 recommended; SP–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. (3 cr; QP–3401; SP–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; QP–3401; SP–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; QP–3301, jr or #; SP–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; QP–3220, 3305, 5401; 5609 recommended; SP–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; QP–3401; 3220 recommended; SP–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; QP–5403 recommended; SP–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; QP–3401; 3305, 3220, 5403 recommended; SP–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.

Course Descriptions

AnSc 4605. Poultry Production Systems

Management. (4 cr; QP–3401; 5405 recommended; SP–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; QP–14609; 5601; SP–14609; 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; QP–14609; 5603; SP–14609; 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; QP–14609; 5604; SP–14609; 4604)
Analysis of dairy production systems using case studies and visits to actual dairies.

AnSc 5099. Special Workshop in Animal Science.

(1-16 cr [max 12 cr]; SP–#: A-F only)
Topics vary. See *Class Schedule* or department. Topics may use guest lectures/experts.

AnSc 5200. Introductory Statistical Genetics and

Genomics. (4 cr; QP–[Stat 3091 or equiv], [GCB 3022 or Biol 4004 or equiv]; SP–[2211 or Stat 3011 or equiv], [GCB 3022 or Biol 4003 or equiv]; A-F only)
Statistical issues in genomics. Gene detection, including statistical analysis/designs for linkage study and for mapping quantitative trait loci. Linkage analysis using pedigree data for codominant/dominant markers. Using radiation hybrid mapping/single cell typing. Design issues in linkage analysis, parentage testing, marker polymorphism.

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; QP–Honors; SP–\$1001; 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; SP–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. Honors: Cultural Anthropology:

Understanding Ourselves and Others. (4 cr; A-F only)
Introduction to anthropology of cultural diversity in the United States, 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. Cultural Anthropology: Understanding

Ourselves and Others. (4 cr)
Introduction to 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. Freshman Seminar. (3 cr; A-F only)

Topics specified in *Class Schedule*.

Anth 1904. Freshman Seminar. (3 cr; A-F only)

Topics specified in *Class Schedule*.

Anth 1909W. Freshman Seminar. (3 cr [max 6 cr];

SP–Fr or no more than 36 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; SP–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; SP–1003 or #)
Studying sociocultural forms by analyzing linguistic data obtained in a fieldwork setting. Students work with a fluent speaker of a non-English language to explore an unfamiliar culture in the manner of an ethnographer working with a key informant.

Anth 3007. Laboratory Techniques in Archaeology.

(4 cr; SP–1001, 3001)
Focuses on plant remains, material culture, faunal remains, and human osteology. Emphasis on lab experience.

Anth 3009. Rise of Civilization. (3 cr)

The concept of civilization, from early hunter gatherer groups through settled agricultural villages to the rise of towns and 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 America (e.g., the greater southwest, prairie/woodland transition zone, Great Lakes area, Northwest coast, etc.).

Anth 3011. Archaeology of the Ancient Near East.

(3 cr; SP–3001)
Development of culture and society in ancient Near East from beginnings of agriculture and settled village life to first states and up to the threshold of imperialism (10,000 to 2,000 B.C.).

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 3019. Hispanic Cultures of Latin America. (3 cr; SP–1003 or #)

Hispanic cultures from Mexico to South America. Topics such as economy; underdevelopment; the family and ritual kinship, gender, religion, values, ideology, and change. Concepts are introduced to explore continuity and change.

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; SP–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; SP–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. Anthropology of Death. (3 cr; QP–1102 or #; SP–1003 or #; A-F only)

Anthropological perspectives on death. Diverse understandings of afterlife, cultural variations in death ritual, secularization of death in the modern era, management of death in medicine, cultural shifts/conflicts in what constitutes good or natural death.

Anth 3041. Ecological Anthropology. (3 cr; SP–\$5041; 1003)

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 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; SP–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 3221. Archaeology Field School. (3-6 cr [max 6 cr]; SP-3001 and #)

Archaeological field excavation, survey and research. Intensive training in excavation techniques, recordation, analysis, and interpretation of archaeological materials.

Anth 3310. Topics in Biological and Physical Anthropology. (3-6 cr [max 6 cr]; SP-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; SP-Jr or sr major)

Evaluation of work to date; planning future course work and prospectus for senior research project. Includes defining senior project, finding an advisor, and developing preliminary bibliography. Normally completed at least two semesters before graduation.

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; SP-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; SP-[1003, jr] or #: A-F only)

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; SP-Sr, anth major; A-F only)

Research seminar. Topics/methodologies differ according to staff, student interests. Students complete substantial research paper.

Anth 4013. Senior Project. (3 cr; SP-Sr major, #)

Independent research project fulfilling the senior option; directed by a faculty member.

Anth 4019. Symbolic Anthropology. (3 cr; SP-\$8211; 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; SP-\$8209; 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; SP-Jr or sr or grad or #: A-F only)

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; SP-1003; A-F only)

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.

Anth 4031. Applied Anthropology. (3 cr; SP-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; SP-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; SP-1003 or 3003 or #)

Anthropological approaches to contemporary American society and culture; tensions between market and family; unity and diversity; individualism and community.

Anth 4051. Kinship, Gender and Diversity. (3 cr; SP-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; SP-\$8205; 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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-1003 or 3003 or #: A-F only)

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 Medicine. (3 cr; QP-Jr or sr or grad student or #: SP-Jr or sr or grad student or #: A-F only)

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]; SP-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]; SP-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]; SP-#)

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]; SP-#)

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]; SP-#)

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]; SP-#)

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; SP-\$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; SP-Sr or grad or #: A-F only)

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; SP-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; SP-\$3041, \$8213; 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; SP-4003 or grad or #)

Anthropological approaches to urban life in Western and non-Western settings. Topics include social networks and voluntary

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organizations; class, ethnicity, gender and power; migration and immigration; urban labor and economics; and urban "problems."

Anth 5059. Anthropology of Religion. (3 cr; SP-1003 or #)

Comparative study of myths, religious beliefs and rituals cross-culturally. Analysis of how religion and social relations are integrated. Careful examination of landmark cases and conceptual approaches in the anthropology of religion.

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 5980. Topics in Anthropology. (3 cr [max 3 cr])
Topics specified in *Class Schedule*.

Applied Business (ABus)

College of Continuing Education

ABus 4011. Historical Perspectives and Contemporary Business Challenges. (3 cr; QP-Business intro course or #; SP-Business intro course or #; A-F only)
Global competitiveness, product and service quality, information revolution, and changing customer and workforce demographics. Approaches to meeting these contemporary challenges studied against a historical backdrop of evolving management practices. Emphasis on developing systematic ways of analyzing complex problems.

ABus 4012. Problem Solving in Complex Organizations. (3 cr; QP-[3031 or #], Web access; must activate UM e-mail account before 1st class; SP-[3031 or #], Web access; must activate UM e-mail account before 1st class; A-F only)

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; QP-Sociology or psychology course or #; SP-Sociology or psychology course or #; A-F only)
Dynamics of small-group behavior with emphasis on work groups in organizations. Factors affecting performance and productivity. Identify formal and informal roles providing a foundation for understanding how effective teamwork is created and sustained. Effective leadership skills and followership practiced.

ABus 4022. Managing Organizational Relationships. (3 cr; A-F only)

Political dimensions of organization life and diagnosing how power is distributed and exercised in modern organizations. Cooperative relationships and frameworks for analyzing motives for observed behavior. Skills for managing upward, lateral, and downward relationships, with emphasis on recognizing potential ethical dilemmas.

ABus 4023. Communicating for Results. (3 cr; QP-English composition or #; SP-English composition or #; A-F only)

Aspects of communication essential for being persuasive and influential. Organizing and presenting ideas effectively, strategies for audience analysis, choosing communication methods, making appropriate use of informal influence methods, and handling dissent. Processes for intercultural communication.

ABus 4024. Effective Oral Communication and Business Presentations. (1 cr; A-F only)

Assists BAB students in building and developing business presentation skills and oral communications effectiveness. Videotaping and supportive critique of actual presentations based on audience analysis, technique selection, and handling both receptive and hostile audiences.

ABus 4025. Negotiating for Agreement. (1 cr; A-F only)
Negotiating to reach high-quality/mutually satisfying agreements and build better working relationships. Practical tools, hands-on practice.

ABus 4031. Accessing and Using Information Effectively. (3 cr; QP-Computer intro course or #; SP-Computer intro course or #; A-F only)

Information's role in business operations. Typology of information applied in case studies and exercises. Accessing external information using library resources such as information search services, CD-ROM, and periodicals. Accessing internal information using a desktop database system and electronic mail or computer conferencing.

ABus 4032. Quantitative Skills for Decision Making. (3 cr; QP-[Math for decision making, college algebra, statistics for decision making] or #; SP-[Math for decision making, college algebra, statistics for decision making] or #; A-F only)

Exploratory data analysis, visual display of data, basic mathematical/statistical analysis. Decision theory/modeling.

ABus 4041. Leadership in a Global and Diverse Workplace. (3 cr; A-F only)

Developing global and ethical perspectives and skills for working in settings with diverse personnel.

ABus 4042. Planning and Implementation at the Business Unit Level. (3 cr; A-F only)

Creating and implementing operating plans. Operations flowcharts, budgets, schedules, and staffing plans. Importance of integrating plans with the overall business strategy. Factors involved in successful implementation. Importance of developing strategies for change.

ABus 4043. Project Management in Practice. (3 cr; QP-[3031, intro to mgmt] or #; SP-[3031, intro to mgmt] or #; A-F only)

Scheduling, coordinating, and allocating resources. Field project with nonprofit community organization, small business, or student's employing organization.

ABus 4044. Tools for International Trade. (3 cr; A-F only)

Emphasis on understanding international forces and trends and identifying ways in which businesses can work within the context of ongoing international change. Tools used in specific transactions and ways to diagnose in what circumstances they are most appropriately applied.

ABus 4101. Accounting and Finance for Managers.

(3 cr; QP-[Two qtrs or one sem of each: intro comp science, intro accounting] or #; SP-[Two qtrs or one sem of each: intro comp science, intro accounting] or #; A-F only)
Principal concepts of finance. Business decision making from accounting/financial perspective. Analyzing cost-volume-profit relationships. Capital budgeting. Variances. Uses/sources of funds. Valuation.

ABus 4102. Operations in Manufacturing and Service Businesses. (3 cr; QP-Small business mgmt or #; SP-Small business mgmt or #; A-F only)

Concepts/principles related to management of operations functions. Operations strategy, process, design, just-in-time, forecasting, inventory management, principles of scheduling, and quality improvement. Relationships between operations and the environment.

ABus 4103. Marketing and Sales. (3 cr; QP-Intro marketing or intro sales or #; SP-Intro marketing or intro sales or #; A-F only)

Legal, behavioral, ethical, competitive, economic, and technological factors and how they affect product pricing, promotion, and marketing channel decisions. Personal selling function as integral part of distribution system. Sales force organization, selection, training, motivation, compensation, forecasting, budgeting, and control.

ABus 4104. Management and Human Resource Practices. (3 cr; A-F only)

Emphasis on day-to-day leadership, including organizing work, motivating employees, delegating, coordinating, and achieving results. Human resource

practices, including selection, induction, and training of new employees; employee appraisal; handling grievances; and discipline.

ABus 4501. Entrepreneurship. (3 cr; SP-To use as BAB capstone course must have completed 75% of BAB coursework; A-F only)

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)

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)

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)

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)

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)

Theme: a small business is not a little big business. Forging a realistic growth trajectory. Designing an 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)

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; SP-Δ; at least seven BAB courses recommended; A-F only)

Management issues in a changing workplace. Topics vary.

ABus 4970. Directed Study. (1-3 cr; QP-BAB student; SP-#, Δ, BAB student; A-F only)

Specialty arranged projects, trips, or field work.

ABus 4999. Practicum. (3 cr; QP-ABus student, at least 33 ABus cr, completed portfolio review, #; SP-ABus student, at least 33 ABus cr, completed portfolio review, #, Δ; A-F only)

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 [max 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 [max 3 cr])

Unemployment and inflation; measures of national income; macro models; fiscal policy and problems; taxes and the national debt; money and banking; monetary policy and problems; poverty and income distribution; international trade and exchange rates; economic growth and development.

ApEc 1251. Principles of Accounting. (3 cr)

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]; QP-#; SP-#)

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; QP-[1101 or Econ 1101], [Math 1142 or Math 1251], [BA 1550 or Stat 1001]; SP-[1101 or Econ 1101], [Math 1142 or Math 1251], [OMS 1550 or Stat 1001])

Intermediate microeconomic theory, its application focusing on both consumer/producer decisions. Theory of supply/demand, market structure. General equilibrium and welfare. Effects of government regulations, market failure.

ApEc 3002. Applied Macroeconomics: Managerial Economics. (4 cr; QP-[[1250 or Acct 1050], 3001] or #; SP-[[1251 or Acct 2050], 3001] or #)

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; QP-ApEc/Econ 1101, 1102; SP-ApEc/Econ 1101, 1102)

The public sector and market economics; public goods, externalities, and other allocation issues; government and the stabilization of the national economy; overview of the new classical and Keynesian models; principles of taxation; individual income tax, sales, business, and property taxes.

ApEc 3007. Applied Macroeconomics: Policy, Trade, and Development. (3 cr; QP-3006 or #; SP-3006 or #) Foreign trade, development, and growth. General equilibrium models show the affects of trading blocks on U.S. agriculture and the broader economy, the importance of growth on incomes, foreign trade, and policies that impact world trade and economic growth.

ApEc 3041W. Economic Development of U.S.

Agriculture. (3 cr; QP-1101, 1102, Econ 1101, 1102 or #; SP-1101, 1102 or Econ 1101, 1102 or #)

Economic, political, social, and technical forces that have shaped the development of U.S. agriculture; the role of agricultural development in national economic development in the United States with implications for developing countries.

ApEc 3071. Agriculture and Economic Growth in Developing Countries. (3 cr; QP-1101, 1102, Econ 1101, 1102 or #; SP-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; QP-1101 or Econ 1101; SP-1101 or Econ 1101; A-F only)

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; QP-1101 or Econ 1101; SP-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)

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. (2 cr; QP-3400 or #; SP-13401)

Economic relationships in the marketing of livestock, dairy, and meat products; product grades; inspection and transportation; market structure, channels, pricing, and competition; government regulations and policies.

ApEc 3451. Food and Agricultural Sales. (3 cr)

Professional selling of agricultural and food products. Build and refine sales abilities, identify and qualify prospects, deliver effective sales presentations, and close the sale; elementary principles of market research. Students develop and deliver a sales presentation.

ApEc 3501. Agribusiness Finance. (3 cr; QP-1250, Acct 1050 or equiv; SP-1251, Acct 2050 or equiv)

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 and issues facing financial intermediaries serving agriculture.

ApEc 3811. Principles of Farm Management. (3 cr; QP-1101 or Econ 1101; SP-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; QP-1101 or Econ 1101, 1250 or Acct 1050; SP-1101 or Econ 1101, 1250 or Acct 1050)

Management of garden centers, grocery stores, and other retail units selling perishable agricultural products.

ApEc 3921. Agricultural Law. (3 cr; QP-1101 or Econ 1101; SP-1101 or Econ 1101; A-F only)

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; QP-#; SP-#)

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]; QP-COAFES jr or sr, #, complete internship contract available in COAFES Career Services before registering; UC only; SP-COAFES jr or sr, #, complete internship contract available in COAFES Career Services before registering; UC only; S-N only) 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; QP-\$Agro 5200, \$CAPS 5280, \$FScN 5643; jr or sr or grad; SP-\$Agro 4103, \$CAPS 4103, \$FScN 4103; 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; QP-1101, 1102 or Econ 1101, 1102; SP-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; QP-\$FScN 5474; 3001, Econ 3101 or #; SP-\$FScN 4451; 3001, Econ 3101 or #)

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 and group projects.

ApEc 4481. Futures and Options Markets. (3 cr; QP-3001 or equiv, Stat 1001 or equiv; SP-3001 or equiv, Stat 1001 or equiv)

Economics of futures and options trading in theory and application; basis and price relationship in storable and nonstorable commodities; hedging and commercial use of futures and options contracts; speculation; pricing efficiency; market performances and regulation.

ApEc 4611. Resource Development and Environmental Economics. (3 cr; QP-1101, 1102 or Econ 1101, 1102 or #; SP-1101, 1102 or Econ 1101, 1102 or #)

Basic concepts of resource use; financial and economic feasibility; external effects and market failures; resource use and environmental problems. Measuring impacts of resource development; economics of alternative resource programs and environmental strategies.

ApEc 4821W. Agribusiness Management. (5 cr; SP-3002, 4501, Mgmt 3001)

Strategic and operations management for production, processing, wholesaling, retailing, and service. Establishing mission and 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; QP-Math 1271, Stat 5021, knowledge of matrix algebra; SP-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; QP-Econ 5151 or #; SP-1Econ 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.

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ApEc 5152. Applied Macroeconomics: Income and Employment. (2 cr; SP–#|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; QP–3006 or Econ 3102 or #; SP–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; QP–3001 or equiv; SP–3001 or equiv; A-F only)

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; QP–[3001 or equiv], [Math 1142 or equiv]; SP–[3001 or equiv], [Math 1142 or equiv])

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; QP–3101 or Econ 3101 or equiv or #; SP–3101 or Econ 3101 or equiv or #)
Theoretical foundations of labor markets, including 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; QP–\$FScN 5474, \$5550; 3001 or Econ 3101; SP–\$4451, \$FScN 4451; 3001 or Econ 3101; A-F only)
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; SP–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; QP–3001 or Econ 3101 or #; SP–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; QP–Sr or grad or #; SP–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; QP–3001, 5610 or Econ 3101; SP–3001, 4611 or Econ 3101)
Economic analyses including project evaluation of current natural resource and environmental issues. Emphasis on intertemporal use of natural resources, natural resource scarcity or adequacy, environmental quality and mechanisms for pollution control, and their implications for public policy.

ApEc 5711. U.S. Agricultural and Environmental Policy. (3 cr; QP–3001 or Econ 3101; SP–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. World Agriculture: Problems, Policies, and Sustainability. (3 cr; QP–3001 or Econ 3101; SP–3001 or Econ 3101)

Comparative agricultural systems and policies, issues of development and protection, resource use and sustainability in major production regions, international policy conflicts, international organizations and assistance, technological change, production and consumption balances.

ApEc 5731. Growth, Technology, and Development. (3 cr; QP–[3101, 3102] or equiv or #; SP–[3101, 3102] or equiv or #)

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; QP–3001 or Econ 3101; SP–3001 or Econ 3101)

Trade policies of import and export nations, gains from trade, trade negotiations and agreements, free trade and common market areas, exchange rate impacts, primary commodities and market instability, current trade issues.

ApEc 5811. Cooperative Organization. (3 cr; QP–3001, 3002 or #; SP–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; SP–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; QP–#; SP–#)

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]; QP–#; SP–#)
Special classes, independent study, and supervised reading and research on subjects and problems not covered in regularly offered courses.

Arabic (Arab)

Department of Afro-American Studies College of Liberal Arts

Arab 1101. Beginning Arabic. (4 cr)
Oral practice, reading, comprehension, basic grammar. For students with no previous training in Arabic.

Arab 1102. Beginning Arabic. (4 cr; SP–1101 or equiv or #)
Comprehension, oral practice, and reading of standard Arabic. Continuation of Afro 1101.

Arab 1201. Colloquial Arabic. (4 cr)
Fundamentals of vocabulary and sentence structure. Introduction to Arabic script. Primarily for business persons and travelers.

Arab 1202. Colloquial Arabic. (4 cr; SP–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; SP–\$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. (4 cr; SP–1102 or equiv or #)
Advanced grammar and conversational practice. Reading Arabic texts.

Arab 3102. Intermediate Arabic II. (4 cr; SP–3101 or #)
Advanced grammar, analyses of readings, oral comprehension.

Arab 3491. Classical Islamic Civilization. (3 cr; SP–\$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; SP–\$Arab 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; SP–\$Arab 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; SP–\$Arab 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; SP–\$Arab 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; SP–#)
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.

Course Descriptions

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; SP–For undergrads 5281 or 5351, arch major; for grads M Arch major or #; A-F only)
Introduction to 3-D studio for architectural modeling, rendering, and animation. Video recording and editing.

Arch 5371. Computer Methods I. (1 cr; SP–¶8251, M Arch major or #; S-N only)
Introduction to current techniques, computer programs, and their application to architectural computing.

Arch 5372. Computer Methods II. (1 cr; SP–5371, ¶8252 and M Arch major or #)
Current techniques, computer programs, and their application to architectural computing and design.

Arch 5373. Computer Methods III. (1 cr; SP–5372, ¶8253, M Arch major or #; S-N only)
Advanced techniques, computer programs, and their application to architectural computing in design, theory, and technology.

Arch 5374. Computer Methods IV. (1 cr; SP–5373, ¶8254, M Arch major or #)
Advanced architectural computing applications in design, history, theory, representation, and technology.

Arch 5381. Introduction to Computer Aided Architectural Design. (3 cr; SP–Arch or BED or M Arch or grad student in LA or #; A-F only)
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; SP–5381, undergrad, [BA Arch major or BED major] or M Arch major or graduate LA major or #; A-F only)
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. (1-3 cr; SP–For undergrads 3412, arch major; for grads M Arch major or #)
Advanced study in architectural history. Readings, research, and seminar reports.

Arch 5411. Principles of Design Theory. (3 cr; SP–M Arch major or #; A-F only)
Principles of design and their instrumentation. How and why architecture theory is generated. Types and significance of formal analysis. Theoretical positions and modes of criticism.

Arch 5423. Gothic Architecture. (3 cr; SP–For undergrads 3411, arch major; for grads M Arch major or #; A-F only)
History of development of architecture and urban design in Western Europe from 1150 to 1400.

Arch 5424. Renaissance Architecture. (3 cr; SP–For undergrads 3411, arch major; for grads M Arch major or #; A-F only)
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; SP–For undergrads 3411, arch major; for grads M Arch major or #; A-F only)
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; SP–For undergrads 3411, 3412, arch major; for grads M Arch 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 5431. 18th-Century Architecture and the Enlightenment. (3 cr; SP–For undergrads 3412, arch major; for grads M Arch major or #; A-F only)
Architecture, urban planning, and garden design in Europe from 1700 to 1850.

Arch 5432. Modern Architecture. (3 cr; SP–For undergrads 3412, arch major; for grads M Arch major or #; A-F only)
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; SP–For undergrads 3412, arch major; for grads M Arch major or #; A-F only)
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; SP–For undergrads 3412, arch major; for grads M Arch major or #; A-F only)
History of architectural theory from antiquity to the 20th century.

Arch 5450. Topics in Architectural Theory. (1-3 cr [max 9 cr]; SP–Arch major or M Arch major or #; A-F only)
Selected topics in architectural theory and criticism.

Arch 5451. Architecture: Defining the Discipline. (3 cr; SP–M Arch major or #; A-F only)
Architecture as a discipline: its nature, role, purpose, and meaning discussed within a general, philosophical, and theoretical framework. Investigation and discussion of paradigms defining architectural theory and practice.

Arch 5452. Architecture: Design, Form, Order, and Meaning. (3 cr; SP–M Arch major or #; A-F only)
Architecture and the issue of meaning. Explores fundamental and constituent elements of architectural form and order; their inherent tectonic, phenomenal, experiential, and symbolic characteristics; their potential and implications for the creation and structure of meaningful human places.

Arch 5454. Semiotics and Deconstruction in Architecture. (3 cr; OP–5401, M Arch major or #; SP–5411, M Arch major or #; A-F only)
Expressive and cultural dimensions of architecture, especially those related to linguistic analogies, knowledge production, and contemporary philosophy. Broad critical perspective of architectural discussion and argumentation addressing current issues.

Arch 5455. Typology and Architecture: Theories of Analysis and Synthesis. (3 cr; OP–5401, M Arch major or #; SP–5411, M Arch major or #; A-F only)
Theoretical traditions and development of typology's role in architecture. Investigates works of Laugier, Quatremere de Quincy, Viollet-Le Duc, Ledoux, Durand, Camillo Sitte, and Le Corbusier. Recent developments and theoretical positions of neo-rational and contextual arguments for contemporary applications of the idea of type.

Arch 5458. Architecture and Culture. (3 cr; SP–3412, arch major or grad student or #; A-F only)
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; SP–Arch or WoSt major or M Arch 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; SP–For undergrads 3412, arch or Amln major; for grads M Arch 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. Environmental and Material Forces in Architecture. (4 cr; QP–3501, 5281, arch major or #; SP–5281, LA 3501, arch major or #; A-F only)
Exploration of relationship between architectural form, human experience, and building technologies. Design principles and concepts of environmental technology (microclimate, thermal, aural, luminous design) and building technology (materials, methods of construction, structure). Impact of ecological issues, construction materials, and structural systems on architectural design.

Arch 5511. Construction Materials in Architecture. (3 cr; SP–M Arch major or #; A-F only)
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 5512. Building Methods in Architecture. (3 cr; SP–5511, M Arch major or #; A-F only)
Analysis of architectural materials, building systems, and construction operations related to enclosure systems design, building infrastructure, and detailing. Application of legal constraints and regulations (e.g., ADA, building codes, life-safety issues) in preparation of drawings, specifications, and construction documents for building design.

Arch 5513. Environmental Technology I: Thermal Design in Architecture. (3 cr; SP–M Arch major or #; A-F only)
Thermal and climatic issues in the design of small and mid-size buildings. Investigations in built and mechanical methods to modify climate. Evaluation of the impact of design techniques on energy use, the environment, and architectural meaning.

Arch 5514. Environmental Technology II: Lighting and Acoustic Design. (3 cr; SP–M Arch major or #; A-F only)
Principles of daylighting, electric lighting, and acoustic design in architecture. Relationship between luminous and acoustic environments, human comfort and architectural experience. Analytical methods, design process, and modeling of daylighting.

Arch 5525. Design in Masonry. (3 cr; QP–5521, M Arch major or #; SP–5512, M Arch major or #; A-F only)
Design principles, construction methods, and document production for masonry structures.

Arch 5539. Daylighting and Architecture Design. (3 cr; QP–5531, M Arch major or #; SP–5514, M Arch major or #; A-F only)
Role of daylighting in architectural design: principles, strategies, energy and environmental issues, psychology of light, color, and integration of electric lighting. Design projects investigate qualitative and quantitative issues through drawing, physical models, and photometric analysis.

Arch 5542. Building Energy Systems. (3 cr; QP–5541, M Arch major or #; SP–5513, M Arch major or #; A-F only)
Understanding functions of building mechanical systems and their integration with other building components through case studies. Residential and commercial HVAC systems, alternative energy sources, energy efficiency, structural implications of mechanical systems, indoor air quality, and environmental control strategies.

Arch 5550. Topics in Architecture Technology. (1-3 cr [max 6 cr]; SP–Arch or M Arch major or #)
Selected topics in architecture technology, including construction, environmental management, energy performance, lighting, or materials.

Arch 5561. Building Production Processes. (3 cr; QP–5283, arch major or BED major or M Arch major or #; SP–5282, 5501, arch major or BED major or M Arch 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; SP–M Arch major or #; A-F only)
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 5572. Architectural Structures II: Concrete and Masonry Design. (3 cr; QP–5573, M Arch major or #; SP–5571, M Arch major or #; A-F only)
Overview of advanced materials: reinforced fiberglass, structural glass, and structural tensile fabrics. Impact of construction technology on architecture and methods of integrating knowledge of structural materials and construction methods into the design process.

Arch 5611. Design in the Digital Age. (3 cr; QP–Grad student or upper level undergrad student; SP–Grad student or upper level undergrad student; 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 5621. Professional Practice in Architecture. (3 cr; SP–M Arch major or #; A-F only)
Legal, ethical, business, and practical requirements of architectural practice. Contemporary and historical models of contract formation, business principles, accounting, project management, design services, and marketing.

Arch 5631. Legal Contracts in Architecture. (3 cr; SP–M Arch major or #; A-F only)
Legal subject matter relevant to the work of architects and design professionals.

Arch 5645. Real Estate Development in Architecture. (3 cr; SP–For undergrads BA Arch major; for grads M Arch major or #)
Fundamentals of real estate development and investment building. Processes and rules of specialists in development of investment projects. Topics include pro forma value and depreciation, tax shelter, feasibility, market analysis, appraisal equity financing, design, construction, leasing, and property management.

Arch 5650. Topics in Architectural Practice. (1–3 cr; SP–5621, arch major or 5621, M Arch 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; SP–Arch or M Arch major or #)
Selected topics in the theory, philosophy, research, and methods of architectural historic preservation.

Arch 5671. Historic Preservation. (3 cr; SP–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; QP–3412, 5411 or #; SP–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; QP–3412, 5512 or #; SP–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; SP–Arch or BED major or M Arch or LA grad major or #; A-F only)
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; SP–Arch or BED or Geog major or M Arch or LA grad major or #; A-F only)
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 5750. Topics in Urban Design. (1–3 cr; SP–5711, M Arch or LA grad major or #; A-F only)
Special topics in theory and practice of urban design.

Arch 5993. Directed Study. (1–4 cr; SP–# only; A-F only)
Guided individual reading or study.

Art (Arts)

Department of Art College of Liberal Arts

Arts 1001. 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)
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 1905. Freshman Seminar. (3 cr [max 6 cr]; SP–Fr or max 36 cr; A-F only)
Topics specified in *Class Schedule*.

Arts 1910. Topics: Freshman Seminar. (3 cr; SP–Fr or max 36 cr; A-F only)
Topics specified in *Class Schedule*.

Arts 3101. Intermediate Drawing. (4 cr; SP–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; SP–1001, 1101, 1102)
Emphasizes development of visual sensibility, individual direction, critical judgment.

Arts 3105. Dimensional Painting. (4 cr; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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.

Course Descriptions

Arts 3307. Sculpture: Traditional Approaches. (4 cr; SP-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; SP-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; SP-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; SP-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]; SP-Honors, #; A-F only)
Individual consultation with a faculty member on visual work, research project, presentation, paper, or bibliography.

Arts 3415H. Honors Exhibition. (2 cr; SP-Magna or Summa Honors candidate, #, Δ; A-F only)
Advanced problems in studio and research, leading to a magna or summa exhibition.

Arts 3416H. Honors Thesis. (1 cr; SP-Summa level honors candidate, #; A-F only)
Summa thesis paper written in support of honors exhibition or in relation to candidate's visual/conceptual interests.

Arts 3444. Major Project. (1 cr; SP-#; S-N only)
Individually designed independent project or exhibition.

Arts 3496. Internship in the Arts. (1-4 cr; SP-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; SP-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; SP-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; SP-1001, 1501)
Expressive/formal aesthetics of woodcut relief, hand lithography. Studio practice/investigation of artistic attitudes as exemplified through historical perspectives, traditional/contemporary uses.

Arts 3505. Papermaking as an Art Form. (4 cr; SP-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. Interactive Art on the Web. (4 cr; SP-[1001, 1601] or #)
Using the Web as medium for creating interactive art. Emphasizes building computer technologies into agents of individual expression. Contemporary issues. Developing personal direction.

Arts 3602. Digital Art: Time and Interactivity. (4 cr; QP-1401, 1602; SP-1001, 1601)
Time-based art using digital/electronic media. Building interactive computer technologies into agents of individual expression.

Arts 3701. Photography: Silver Processes. (4 cr; SP-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 [max 12 cr]; SP-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 [max 12 cr]; SP-1001, 1701)
Photographic digital imaging in fine arts. Manipulation, computer applications. Editing in photo imaging software.

Arts 3801. Ceramics: Wheel Throwing. (4 cr; SP-1001, 1801)
Expands wheel-throwing skills, develops aesthetic awareness of ceramic forms. Kiln firing, glaze formulation.

Arts 3802. Ceramics: Handbuilding. (4 cr; SP-1001, 1801)
Intermediate handbuilding. Development of abilities, critical awareness. Kiln firing, glaze formulation.

Arts 3803. Ceramics: Mold Making. (4 cr; SP-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; SP-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; SP-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; SP-3105 or #)
Illusory 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; SP-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]; SP-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]; SP-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]; SP-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]; SP-3301 or #)
Direct metal sculpture in steel, other metals. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery.

Arts 5320. Advanced Sculpture: Spatial Problems. (4 cr [max 12 cr]; SP-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]; SP-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]; SP-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]; SP-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]; SP-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]; SP-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]; SP-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; SP-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; SP-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; QP-[1401, one 1xxx art course] or #; SP-[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; SP-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]; SP-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]; SP-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]; SP-3505 or #)
Distinct expressive qualities of handmade paper, its versatility as contemporary art form. Independent research pursued in consultation with instructor.

Arts 5610. Advanced Electronic Art. (4 cr [max 12 cr]; SP-3601 or #)
Synthesis of artistic form/content using digital technologies. Independent projects pursued in consultation with instructor.

Arts 5710. Advanced Photography. (4 cr [max 12 cr]; SP—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]; SP-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 SP-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]; SP-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]; SP-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]; SP-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 1016V. Honors: Introduction to Asian Art. (4 cr; QP-Permission of CLA honors adviser; SP-§1016W; permission of CLA honors adviser)
Issues/themes of South Asian, Southeast Asian, East Asian art from earliest times to present.

Arth 1016W. Introduction to Asian Art. (4 cr)
An introduction to the issues and themes of South Asian, Southeast Asian, and East Asian art from earliest times to the 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]; SP-Fr or no more than 36 cr; A-F only)
Topics specified in *Class Schedule*.

Arth 1921W. Introduction to Film Study. (4 cr; SP-§CSCS 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. Sermin, 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. (4 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. (4 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 19th 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; SP-[Jr or sr] Arth major; A-F only)
Major art-historical theme, artist, period, or genre. Topics specified in *Class Schedule*.

Arth 3930H. Honors: Junior-Senior Seminar. (3 cr; QP-Honors [Jr or sr] Arth major; SP-Honors [Jr or sr] Arth major; A-F only)
Major art-historical theme, artist, period, or genre.

Course Descriptions

- Arth 3940. Topics in Art History.** (1-4 cr)
Topics specified in *Class Schedule*.
- Arth 3971V. Honors: Major Project.** (1 cr; SP-Honors Arth major; #; A-F only)
Completion of research paper begun in a 5xxx course.
- Arth 3971W. Major Project.** (1 cr; SP-Arth major; #; A-F only)
Completion of research paper begun in a 5xxx course.
- Arth 3975. Directed Museum Experience.** (1-2 cr; SP-#; S-N only)
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]; SP-#; A-F only)
- Arth 3994. Directed Research.** (1-4 cr [max 12 cr]; SP-#; A-F only)
- Arth 5103. Hellenistic and Early Roman Art and Archaeology.** (3 cr; SP-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; SP-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; SP-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; SP-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 cr [max 3 cr]; SP-#)
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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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 19th and 20th centuries including the 1893 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; SP-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 socio-historical 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; SP-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; SP-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; SP-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 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. (3 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]; SP-#; A-F only)

Arth 5994. Directed Research. (1-4 cr [max 12 cr]; SP-#; A-F only)

Astronomy (Ast)

*Department of Astronomy
Institute of Technology*

Ast 1001. Exploring the Universe. (4 cr; QP-§1011, §1021H, §1031, §1032; SP-§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 1011H. Exploring the Universe, Honors. (4 cr; QP-§1011, §1031, §1032; high school trigonometry, high school physics or chemistry; SP-§1001, 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; QP-§Geo 1019, §EEB 1019; SP-§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 2001. Introduction to Astrophysics. (4 cr; QP-1 yr calculus, Phys 3254 or #; SP-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; QP-1 yr calculus, Phys 1253, #; SP-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; QP-3051, Phys 3513 or #; SP-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; QP-3051, Phys 3513 or #; SP-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; QP-Upper div CLA or upper div IT or grad or #; SP-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; QP-[Upper div honors student in IT or CLA], #; SP-[Upper div honors student in IT or CLA], #)
Based on department's research seminar.

Ast 4990. Directed Studies. (1-5 cr; QP-3051, #; SP-2001, #)

Independent, directed study in observational and theoretical astrophysics. Arranged with faculty member.

Ast 4994W. Directed Research. (3-5 cr; QP-#; SP-#)
Independent research in observational or theoretical astrophysics. Senior Thesis for undergraduate astrophysics majors. Arranged with faculty member.

Ast 5012. The Interstellar Medium. (4 cr; QP-3051, Phys 3513 or #; SP-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; QP-3051, Phys 3513 or #; SP-2001, Phys 2601 or #)
Large-scale structure and history of the universe. Introduction to Newtonian and relativistic world models. Physics of early universe, cosmological tests, formation of galaxies.

Ast 5201. Methods of Experimental Astrophysics. (4 cr; QP-3051, Phys 3512; SP-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; QP-High school chem or #; SP-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; QP-Chem 1001 or 1 qtr of college chem; SP-§BioC 1012, 3001; 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; QP-Biol 1009 or 1202, 8 cr organic chemistry; SP-§Biol 3021; 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]; QP-#; S-N only)
Lectures, discussion on current research in the department.

BioC 4001. Biochemistry for Medical Technology. (3 cr; QP-[General chem, organic chem] or #; SP-[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; QP-5300 or #; SP-4001 or #)
Physiological biochemistry. Emphasizes processes occurring in humans.

BioC 4025. Laboratory in Biochemistry. (2 cr; QP-3021 or 5331; SP-3021 or 4331 or Biol 3021)

Theory and principles of the fundamental techniques used in modern biochemistry laboratories as well as the practical use of these techniques during the laboratory part of the course.

BioC 4331. Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems. (4 cr; QP-[Biol 1009 or Biol 1202], two qtrs organic chemistry] or #; SP-[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; QP-5332 or #; SP-4331 or #)
Advanced survey of molecular biology, mechanisms of gene action, and biological regulation.

BioC 4418. Topics in Molecular Immunology. (3 cr; QP-MicB 5218 or #; SP-MicB 4131 or #; A-F only)
Molecular interactions occurring among proteins and peptides involved in immune recognition.

BioC 4521. Introduction to Physical Biochemistry. (3 cr; QP-Chem 1052, Math 1261, Phys 1253; SP-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]; QP-#, Δ; no more than 10 cr of [5970, 5990] may count toward major requirements; SP-#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only)
Individual study on selected topics or problems. Emphasizes readings, use of scientific literature. Writing Intensive.

BioC 4794W. Directed Research: Writing Intensive. (1-7 cr [max 15 cr]; QP-#, Δ; no more than 10 cr of [5970, 5990] may count toward major requirements; SP-#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only)
Laboratory or field investigation of selected areas of research. Writing intensive.

BioC 4993. Directed Studies. (1-7 cr [max 7 cr]; QP-[10 cr max of 5970 and/or 5990 may count toward major requirements]; #, Δ; SP-[7 cr max of 4993 and/or 4994 may count toward major requirements]; #, Δ; S-N only)
Individual study on selected topics or problems with emphasis on selected readings and use of scientific literature.

BioC 4994. Directed Research. (1-7 cr [max 15 cr]; QP-[10 cr max of 5970 or 5990 may count toward major requirements]; #, Δ; SP-[7 cr max of 4993 or 4994 may count toward major requirements]; #, Δ; S-N only)
Laboratory or field investigation of selected areas of research.

BioC 5309. Biocatalysis and Biodegradation. (3 cr; QP-§MicB 5309; chemistry through organic chemistry; knowledge of word processing, e-mail, access to World Wide Web, access to college-level science library recommended; SP-§MicB 5309; 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; QP-§MicB 5352; BioC 3021 or BioC 5331 or MicB 5321, Biol 5013 or #; SP-§MicB 5352; 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.

Course Descriptions

BioC 5361. Microbial Genomics. (3 cr; SP—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; QP–3021 or 5331; SP–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; QP–3021 or 5331 or Phsl 3052 or #; SP–SPhsl 5444; 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; QP–3021 or 5331 or #; SP–3021 or 4331 or Biol 3021 or #) Membrane structure. Mechanisms and physiological roles of channels, pumps, and membrane enzymes.

BioC 5527. Physical Biochemistry: Biopolymer Structure, Energetics, and Dynamics. (4 cr; QP–\$MdBc/Chem 5527; intro physical chemistry or equiv required, intro biochemistry desirable; SP–\$MdBc 5527; intro physical chemistry or equiv, intro biochemistry desirable)

Application of thermodynamics and statistical thermodynamics to solution behavior, binding, and helix-coil transitions of proteins and nucleic acids. Use of kinetics to elucidate enzyme mechanisms. Hydrodynamic, scattering, and crystallographic approaches to biopolymer structure.

BioC 5528. Physical Biochemistry: Spectroscopy. (4 cr; QP–\$MdBc/Chem 5528; intro physical chemistry or equiv required, intro biochemistry desirable; SP–\$MdBc 5528; intro physical chemistry or equiv required, intro biochemistry desirable)

Application of NMR, electron spin resonance, optical, infrared, and circular dichroism spectroscopies to proteins, nucleic acids, and membranes.

BioC 5530. Selected Topics in Molecular Biophysics. (1-3 cr [max 9 cr]; QP–\$Chem 5530, \$MdBc 5530; 5525 or MdBc 5525 or Chem 5525 or 5526 or 5527 or 5528 or equiv; SP–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; QP–[[One organic chemistry or biochemistry course], [two calculus or college physics courses]] or #; SP–[[One organic chemistry or biochemistry course], [two calculus or college physics courses]] or #; S-N only)

Macromolecular crystallography for protein structure determination/engineering. Determining macromolecule structure by diffraction.

BioC 5532. Macromolecular Crystallography II: Techniques and Applications. (1 cr; QP–5531; SP–5531; S-N only)

Determining structure of macromolecule by diffraction. Using software in macromolecular crystallography.

Biology (Biol)

College of Biological Sciences

Biol 1001. Introductory Biology I: Evolutionary and Ecological Perspectives. (4 cr)

Biological diversity from genetic variation to the diversity of species and 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; QP–[1201 or equiv], Chem 1051; SP–[1001 or equiv], Chem 1021; A-F only)

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; QP–High school chemistry, 1 term college chemistry recommended; SP–High school chemistry, 1 term college chemistry recommended)

Introduction to major concepts of modern biology. Topics include molecular structure of living things, energy recruitment and utilization, flow of genetic information through organisms and 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; SP–#; S-N only)

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 1051. Introduction to Environmental Science. (3 cr; SP–SES 1051)

A study of current environmental issues that impact the world including air and water pollution, human population, toxic and hazardous wastes, urbanization, land use, biological diversity, energy, attitudes toward nature, environmental politics, and ethics.

Biol 1093. Biology Colloquium: Directed Study. (1 cr; QP–Biol 1951 or 1952 or 1953; SP–1020 and ¶1020; S-N only)

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; QP–No cr if taken after 5003 or GCB 3022; SP–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; SP–[45 or fewer cr] or #; A-F only)

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; QP–1951 or 1952 or 1953; SP–1020; S-N only)

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; QP–Biol 3111; may not be taken for credit after Biol 1106;

SP–3211 or ¶3211; may not be taken for credit after Biol 2012)

Dissection and direct observation of representatives of major animal groups.

Biol 2012. General Zoology. (4 cr; QP–1009 or 1201; SP–1009 or 1001)

Surveys major animal groups (phyla) with applications of morphological, physiological, and developmental characteristics to define evolutionary relationships. Discuss parasitic forms affecting human welfare. Lab requires dissection including mammals.

Biol 2022. General Botany. (3 cr; QP–1009 or 1201; SP–\$2822; 1001 or 1009; A-F only)

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; QP–1203 or 1009, Chem 1052; intended primarily for non-microbiology majors; SP–1002 or 1009, Chem 1022; 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. Includes lab.

Biol 2201. Introduction to Computing in Biology. (1 cr; QP–[1009 or 1202 or equiv], biological sciences major; SP–[1009 or 1002 or equiv], biological sciences major; S-N only)

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; QP–\$1103; 1009 or 1201; SP–\$2022; 1001 or 1009; A-F only)

Principles of plant biology. Organization, function, growth/development, and reproductive biology of plants and plant-like organisms. Lab, field work.

Biol 3002. Plant Biology: Function. (2 cr; QP–1202 or 1009, one qtr chemistry with some organic content [e.g., Chem 1001]; SP–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; QP–[1009 or 1202], one qtr chemistry with some organic content [e.g., Chem 1001]; SP–¶3002)

Various plant processes at subcellular, organ, whole plant levels. Lab, recitation.

Biol 3007. Plant Biology: Diversity and Adaptation. (4 cr; QP–1009 or 1201, 1202, Chem 1051; SP–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; QP–1009 or 1202, 8 cr organic chemistry; SP–\$BioC 3021; 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; QP–\$Nsc 3101, \$Phsl 3101; BioC 3021 or BioC 5331; SP–\$Nsc 3101, \$Phsl 3101; 3021 or BioC 3021 or BioC 4331)

Basic principles of cellular/molecular neurobiology and nervous systems.

Biol 3102. Introduction to Neuroscience II: Biological Basis of Behavior. (3 cr; QP–\$Nsc 3102, \$Phsl 3102; 3101, or Nsc 3101 or Phsl 3101; SP–\$Nsc 3102, \$Phsl 3102; 3101, or Nsc 3101 or Phsl 3101; A-F only)

Organization of neural systems and subsystems underlying the sensory and motor aspects of behavior.

Course Descriptions

BME 5041. Tissue Engineering. (3 cr; SP-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.

BME 5101. Bioelectric Measurements and Therapeutic Devices I. (3 cr; SP-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 and flow.

BME 5102. Bioelectric Measurements and Therapeutic Devices II. (3 cr; SP-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.

BME 5150. Biomedical MEMS. (4 cr; SP-Analog circuit principles, basic electromagnetic theory; A-F only)
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.

BME 5201. Musculoskeletal Biomechanics. (3-4 cr; SP-IT upper div or grad student, AEM [statics, deformable media] or #)
Introduction to biomechanics of musculoskeletal system. Description of anatomy and tissue material properties. Kinematics, dynamics, and control of joints and limb movement. Analysis of forces and motions within joints. Application to injury, disease, and treatment of specific joints, design of orthopedic devices, and implants.

BME 5310. Biological Transport Processes. (3-4 cr; SP-IT upper div or grad student or #; ChEn 5103 or ME 5342 recommended; A-F only)
Introduction to biological fluid, mass, and heat transport. Mass transfer across membranes; fluid flow in vessels and interstitium; heat transfer in cells, tissues, and body. Applications to blood oxygenation, respiration, drug delivery, and tissue engineering.

BME 5350. Cell Engineering. (3 cr; QP-Cell biol or equiv; SP-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.

BME 5371. Biomedical Applications of Heat Transfer in Humans. (3-4 cr; QP-Phsl 3053, Phsl 3056, Phsl 5441; SP-Phsl 3053, Phsl 3056, Phsl 5441)
Overview of physiology underlying thermoregulation in humans, clinical applications of heat transfer in humans, and framework for a design project.

BME 5501. Biology for Biomedical Engineers. (3-4 cr; SP-Engineering upper div or grad student)
Concepts of cell/tissue structure/function. Basic principles of cell biology. Tissue engineering, artificial organs.

BME 5502. Pathobiology of Medical Devices. (3 cr; QP-IT upper division or grad student; SP-IT upper division or grad student; A-F only)
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.

BME 5910. Special Topics in Biomedical Engineering. (1-4 cr)
Special topics.

BME 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; QP-Math 1251; SP-Math 1271; A-F only)
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; QP-Biol 1009; SP-Biol 1009; A-F only)
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; QP-IT, 3031, [AEM 3200 or CE 3400], Biol 1009; SP-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; QP-#; SP-#)
Independent study of topic(s) involving physical principles as applied to agricultural production and land resources.

BAE 4013. Transport in Biological Systems. (3 cr; QP-3150, CE 3400, ME 5342; SP-3013, CE 3502, ME 3324, upper div IT; A-F only)
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.

BAE 4023. Instrumentation and Control for Biological Systems. (3 cr; QP-EE 1400, EE 3009, ME 3900 or Stat 3091; SP-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; QP-Upper div IT, 20 cr BAE completed or in progress; SP-2113, upper div IT, sr or #; A-F only)
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; QP-5891; SP-4112; A-F only)
Complete design project started in 4112. Report, poster, and oral presentation of final design.

BAE 4313. Design of Machine Systems. (3 cr; QP-AEM 3016, AEM 3036; SP-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; QP-AEM 3016, AEM 3036; SP-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; QP-3052 or CE 3300, CE 3400, upper div IT or grad in IT major; SP-3023 or CE 3301, CE 3502, upper div IT; A-F only)
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; QP-Upper div IT or grad, 3052; SP-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; QP-3150; SP-3013, upper div IT; A-F only)
Fermentation and separation as applied to biological systems; product recovery in bioprocess technology; topics in bioremediation; modeling of separation processes in biological systems.

BAE 4723. Food Process Engineering. (3 cr; QP-Upper div IT or grad in IT major, ChEn 5103 or ME 5342; SP-CE 3502, ME 3324, upper div IT)
Application of principles of heat transfer and fluid flow to design of food processing operations such as thermal and aseptic processing, freezing, pumping, drying, evaporation, and extrusion. Marketing, government regulation, nutrition issues.

BAE 4900. Intern Reports. (2 cr [max 4 cr]; QP-IT or COAFES student in BAE, #; SP-IT or COAFES student in BAE, #; S-N only)
Reports on intern work assignments reviewed by faculty and industry advisers.

BAE 5095. Special Problems. (1-5 cr; QP-#; SP-#)
Advanced individual-study project. Application of engineering principles to specific problem.

BAE 5513. Watershed Engineering. (3 cr; QP-Upper div IT or grad, 3052 or CE 3300, CE 3400; SP-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)

BA 1998. Independent Study. (1-4 cr [max 8 cr]; SP-[CSOM fr or soph], □)
Special project or independent study.

BA 3033W. Business Communication. (4 cr; OP–Fr composition, CSOM; SP–Fr composition, CSOM upper div; A-F only)

Written/oral communications skills for effective participation in contemporary organizations. From basic principles to communication strategy. Communication technology. Cases, simulations of “real-world” situations.

BA 3101W. Global Seminar: Supplemental Writing. (1 cr [max 1 cr]; SP–¶3100; S-N only)

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; SP–CSOM upper div, □)

Student-initiated project or independent study.

BA 3999. Independent Study: Internship. (1-4 cr [max 8 cr]; SP–CSOM upper div, □)

Faculty supervised independent/directed study associated with internship or with formal work experience.

Business and Industry Education (BIE)

Department of Work, Community, and Family Education

College of Education and Human Development

BIE 1301. Introduction to Vocational and Technical Teaching. (2 cr; A-F only)

Techniques for the occupationally certifiable individual who plans to enter the field of vocational teaching. Required for initial state vocational licensure.

BIE 1396. Supervised Vocational-Technical Teaching. (2 cr; S-N only)

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; SP–¶3111)

Study of manufacturing concepts, principles, and applications; automated manufacturing, including computer integrated manufacturing and robotics; design, operation, and management of manufacturing systems and products; lab.

BIE 3114. Construction Technology. (3 cr; SP–¶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; SP–¶3121; A-F only)

Information and communication systems, electronic publishing, printing technology, broadcast and recording technologies, telephone and online communication, photography, multimedia, and computer technology. Lab.

BIE 3123. Energy, Power, and Transportation Technology. (3 cr; SP–¶3121; A-F only)

Explores mechanical, fluid, and electrical power and technologies associated with the transportation of people and materials. Lecture and lab.

BIE 3151. Technical Development: Advanced. (1-4 cr [max 12 cr])

Individualized advanced technical development in construction, communication technology, manufacturing, power and energy, and transportation.

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 Microcomputer Applications. (3 cr)

Instructional uses of microcomputers and representative business and marketing education applications, including word processing, databases, spreadsheets, and graphics.

BIE 5012. Advanced Word Processing. (3 cr; SP–5011 or equiv)

Develop and apply solution methods for office problems using word-processing software, including advanced editing, printing and desktop publishing capabilities.

BIE 5013. Spreadsheet Analysis Using Microcomputers. (3 cr; SP–5011 or equiv)

Develop expertise in using spreadsheets to analyze data, monitor business records, and create models.

BIE 5014. Database Microcomputer Applications. (3 cr; SP–5011 or equiv)

Examination of business needs requiring computerized databases. Using microcomputer database software to develop, maintain, and prepare reports.

BIE 5015. Integrated Microcomputer Applications in Business and Marketing Education. (3 cr; SP–5011, 5012, 5013, 5014 or equiv)

Use of realistic business microcomputer problems requiring the integration of two or more application packages. Pedagogical issues of learning advanced microcomputer application capabilities and teaching similar applications to designated groups of learners.

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; SP–3111, 3112, 3121, 3122; A-F only)

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; SP–3112; A-F only)

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 5401. Introduction to Business and Marketing Education. (3 cr)

Conceptual models of business and marketing education useful in the design and delivery of business and marketing education programs in secondary and post secondary schools, adult education settings, and business and industry.

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 Concepts. (3 cr)

Recent research and developments in teaching business concepts related to economics, business organization and management, business law, entrepreneurship, marketing, international business, information systems, accounting, risk management, and personal finance.

BIE 5457. Methods of Teaching for Business Employment. (3 cr)

Recent research and developments in teaching for business employment, including administrative support positions, accounting and information processing, marketing, sales, computer operations, and 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 5596. Occupational Experience in Business and Industry. (1-10 cr [max 10 cr]; S-N only)

Observation and employment in business and industry to developing technical or occupational competencies; 100 clock hours of supervised work experience per credit.

BIE 5597. Internship: Business and Industry Education. (1-8 cr [max 12 cr]; SP–#; S-N only)

Practical experience in business or industry as a professional educator or supervisor. Requires an integrative paper.

BIE 5601. Student and Trainee Assessment. (2 cr; A-F only)

Development of tests of knowledge; effect and processes for programs focused on instruction of skills associated with business and industry; development of learning progress reporting systems; evaluation of instructional effectiveness.

BIE 5605. Critical Issues in Business and Industry. (3 cr)

Identification and analysis of major current issues in business and industry education.

Course Descriptions

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; SP-5011 or equiv)

Designing, creating, and presenting information using multimedia resources in business settings.

BIE 5629. Course Development for Business and Industry. (2 cr; A-F only)

Identifying content, objectives, sequencing, planning lessons, methods, and media for instruction, evaluation, and feedback.

BIE 5661. Instructional Methods for Business and Industry Education. (2 cr)

Basic instructional strategies and techniques in instructional settings, from schools and colleges to business and industry.

BIE 5662. Computer Training in School and Industry Settings. (3 cr; SP-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 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, Government, and Society (BGS)

Department of Strategic Management

Curtis L. Carlson School of Management

BGS 3002. Business and Society in the U.S. and World Economy. (4 cr; A-F only)

Insights into ethical constraints and imperatives, stakeholder management and role of government regulations and the public policy process in domestic and global operations; technology and legal aspects; knowledge and skills to deal with the conflicts faced domestically and globally by managers.

BGS 3014. Topics in International Business, Government, and Society. (4 cr; A-F only)

Selected topics.

BGS 3040. Environment of the International Firm. (4 cr; SP-Mgmt 3001, CSOM upper-div major; A-F only)

Challenges, opportunities, and problems businesses face when operating outside their domestic environment. Competitive forces that have consequences for their performance/survival. Broad introduction to international economics, finance, and trade issues that affect multinational business decisions/operations.

BGS 4004. Managing the Multinational Business. (4 cr; QP-BA 3040; SP-BA 3040; A-F only)

Structures and strategies of the global business including issues such as personnel, technology, and operations in host nations. Introduction to the challenges unique to the management of the multinational firm that may involve topics such as comparative culture, trade, and ethics.

Business Law (BLaw)

Department of Accounting

Curtis L. Carlson School of Management

BLaw 3058. The Law of Contracts and Agency. (4 cr; QP-40 or more credits; SP-40 or more credits; A-F only)

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).

Cell Biology and Neuroanatomy (CBN)

*Department of Cell Biology and Neuroanatomy
Medical School*

CBN 1027. 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.

CBN 5058. Anatomy for Physical Therapy. (5 cr; SP-Regis physical therapy student; A-F only)

Lecture and lab dissection of bones, muscles, nerves, vessels, connective tissue, and selected internal organs plus joint structures of limbs, spinal column, head, and pelvis. Includes some histology and embryology. Correlation of all content to clinical conditions.

Center for Spirituality and Healing (CSpH)

Health Sciences

CSpH 5100. Introduction to Complementary Healing Practices. (3 cr)

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 5110. Ways of Thinking About Health. (2 cr)

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 5200. Art of Healing: Self as Healer. (1 cr)

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 5210. Peacemaking and Spirituality: A Journey Toward Healing and Strength. (2 cr; A-F only)

Influence of spirituality on resolving conflict, making peace in intense interpersonal/intrapersonal conflicts in multiple health care, social work settings.

CSpH 5300. Cultures, Faith Traditions, and Health Care. (2 cr; A-F only)

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 5310. Introduction to Traditional Chinese Medicine. (2 cr; A-F only)

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 5400. Dietary Supplements and Nutraceuticals: Botanicals and Nutraceuticals. (3 cr)

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.

Central Asian Studies (CAS)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

CAS 3511. Ancient Iran. (3 cr; SP-\$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; SP-\$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; SP-\$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; SP-\$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; SP-\$5532, \$MELC 3532)

Rise and fall of the Mongol Empire, formation of the Chagatai 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; SP-\$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; SP-\$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 5311. Medieval Sages. (3 cr; SP-\$MELC 5311; 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 Firdowski are among the sages whose lives are examined.

CAS 5526. Islam and Communism. (3 cr; SP-\$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; SP-\$3532, \$MELC 5532)

Rise and fall of the Mongol Empire, formation of the Chagatai 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; SP-\$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; SP-\$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; SP-#, Δ, □)

Chemical Engineering (ChEn)

Department of Chemical Engineering and Materials Science

Institute of Technology

ChEn 1001. Advances in Chemical Engineering. (1 cr; SP-Recommended for [chemical engineering, materials science/engineering] majors; S-N only)

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; QP-Math 3261, Phys 1253, Chem 3302, ChEn major; SP-Math 2263, Math 2243 or ¶Math 2243, Phys 1302, Chem 2302 or ¶Chem 2302, ChEn major; A-F only) Description and analysis of chemical engineering systems: units and dimensions, materials balances on systems with and without chemical reactions, elementary phase equilibria and phase diagrams, energy balances. Numerical methods for typical chemical engineering problems.

ChEn 4002. Transport Phenomena. (4 cr; QP-ChEn 5001, ChEn 5101, upper div ChEn major; SP-ChEn 4001, upper div ChEn major; A-F only) Fluid statics and dynamics and their applications to chemical engineering systems, conduction, and diffusion.

ChEn 4003. Heat and Mass Transfer. (4 cr; QP-ChEn 5102, upper div ChEn major; SP-ChEn 4002, upper div ChEn major; A-F only) Principles and applications of heat and mass transfer in chemical engineering systems.

ChEn 4004. Separation Processes. (4 cr; QP-ChEn 5103, ChEn 5201; SP-ChEn 4003, ChEn 4101; A-F only) Introduction to unit operations and mass transfer operations used in separation processes.

ChEn 4101. Chemical Engineering Thermodynamics. (4 cr; QP-Chem 5534, ChEn 5101; SP-ChEn 4001 or ¶ChEn 4001, Chem 3501; A-F only) Applications of concepts of thermodynamics and chemical equilibrium to problems in chemical engineering.

ChEn 4102. Reaction Kinetics and Reactor Engineering. (4 cr; QP-ChEn 5201, ChEn 5202; SP-ChEn 4001, ChEn 4101; A-F only)

Chemical equilibrium and chemical kinetics applied to chemical engineering systems. Behavior and design of chemical reactors, interaction between chemical and physical rate processes. Mathematical modeling and design of reactors.

ChEn 4401W. Chemical Engineering Lab I. (3 cr; QP-ChEn 5151, ChEn 5102, ChEn 5201; SP-ChEn 4003, ChEn 4101; A-F only)

Principles and 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 and written presentations.

ChEn 4402W. Chemical Engineering Lab II. (3 cr; QP-ChEn 5401; SP-ChEn 4003, ChEn 4004) Principles and 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 and written presentations.

ChEn 4501W. Chemical Engineering Process Design. (3 cr; QP-ChEn 5104, ChEn 5401, ChEn 5301; SP-ChEn 4003)

Engineering economics of process evaluation, including time and bases for cost estimation. Engineering design through group projects. Case studies.

ChEn 4502W. Chemical Engineering Process Design II. (3 cr; QP-ChEn 5501; SP-ChEn 4004, ChEn 4501; A-F only) Continue review (from 4501) of unit processes and operations, introducing detail for design, cost analysis, control, operability, modifications, and alternatives. Case studies and special topics.

ChEn 4593. Directed Study. (1-4 cr; QP-#; SP-#) Directed study under faculty supervision.

ChEn 4594. Directed Research. (1-4 cr; QP-#; SP-#) Independent lab research under faculty supervision.

ChEn 4595. Special Topics. (1-4 cr; QP-#; SP-#) New or experimental special topics course.

ChEn 4601. Process Control. (3 cr; QP-ChEn 5301, ChEn 5104; SP-ChEn 4102; A-F only)

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; QP-ChEn 5601; SP-ChEn 4601 or ¶ChEn 4601; A-F only) 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 5103. Porous Media. (3 cr; QP-ChEn 5103, ChEn 5202; SP-\$MatS 8219, ChEn 4003, ChEn 4102; A-F only) 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; QP-ChEn 5103, ChEn 5202; SP-ChEn 4003, ChEn 4102; A-F only)

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 5302. Chemical Reaction Engineering and Catalysis. (3 cr; QP-ChEn 5301; SP-ChEn 4102; A-F only)

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 5751. Biochemical Engineering. (3 cr; QP-ChEn 5103 or #; SP-ChEn 4002; A-F only)

Chemical engineering principles applied to analysis and design of complex cellular and 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 5753. (Biological) Biomedical Transport Processes. (3 cr; QP-ChEn senior or #; SP-\$ME 5381, \$BME 5310; 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; QP-ChEn 5103; SP-ChEn 4002; A-F only)

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; QP-ChEn 5103 or #; SP-ChEn 4002; A-F only)

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.

Chemistry (Chem)

Department of Chemistry
Institute of Technology

Chem 1011. General Principles of Chemistry. (4 cr; QP—For students not passing placement exam; high school chemistry or equiv, two yrs high school math; high school physics recommended; SP—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; QP—Primarily for science or engineering majors; 1001 or passing placement exam; SP—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; QP—1051 or equiv; SP—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 1031. Honors Chemistry I. (4 cr; QP—[IT honors stu or permission from IT honors office], [1001 or placement exam]; SP—IT honors student or [□, permission from IT honors office]; A-F only) 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; QP—[IT honors student or consent of IT honors office], [1051H or equiv or placement exam]; SP—[1031 or equiv], [IT honors student or consent of IT honors office]; A-F only) 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 2094. Directed Research. (1-3 cr; QP—#; SP—#) Learning experience in areas not covered by regular courses. Individually arranged with faculty member.

Chem 2101. Introductory Analytical Chemistry Lecture. (3 cr; QP—1052, 3301; SP—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; QP—5130; SP—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; QP—1052 or equiv; SP—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; QP—3301; SP—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. (3 cr; QP—3302; SP—2302 or ¶2302) Lab techniques in synthesis, purification, and characterization of typical organic compounds.

Chem 2312. Honors Organic Lab. (5 cr; QP—3301, Chem, [ChemE or BioC major]; SP—[2301 or ¶2301], [Chem or ChemE or BioC] major, #; A-F only) Honors organic chemistry lab.

Chem 2910. Special Topics in Chemistry. (1 cr [max 6 cr]; QP—1 qtr 1xxx chemistry or #; SP—1 sem 1xxx chemistry or #; S-N only) Topics in chemistry. Opportunities and current research.

Chem 2920. Special Topics In Chemistry. (1 cr [max 6 cr]; QP—1 qtr 1xxx chemistry or #; SP—1 sem 1xxx chemistry or #; S-N only) Topics in chemistry. Opportunities and current research.

Chem 3501. Physical Chemistry I. (3 cr; QP—1052, Math 3251, Phys 1253; SP—One yr college chemistry, one yr college physics, one yr college calculus) 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 3502. Physical Chemistry II. (3 cr; QP—1052, Math 3251, Phys 1253; SP—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]; QP—Any 5xxx chem course, #; SP—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; QP—5130, 5131, [5501 or 5534]; SP—2101, 2111, 3501; A-F only) 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; QP—5133, chemistry major; SP—4101, chemistry major; A-F only) 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; QP—3302, 3306, 5501 or 5534, chemical engineering major; SP—2302, 2311, 3501, chemical engineering major; A-F only) Strategies and techniques for analysis. Use of modern instruments, including spectrophotometry, chromatography and electrochemistry.

Chem 4311W. Advanced Organic Chemistry Lab. (2 cr; QP—3302, 3306; SP—2311) Reactions, techniques, and instrumental methods in synthetic organic chemistry.

Chem 4501. Physical Chemistry I. (3 cr; SP—Grad student, one yr college chemistry, one yr college physics, one yr college calculus, Δ; A-F only) 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; SP—Grad student, one yr college chemistry, one yr college physics, one yr college calculus, Δ; A-F only) 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; QP—5501 or 5534, 5502 or 5533, chemistry major; SP—3501-3502, chemistry major) Experiments illustrating principles and methods of thermodynamics, reaction kinetics, and quantum mechanics.

Chem 4701. Inorganic Chemistry. (3 cr; QP—5501 or 5534; SP—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; QP—5702, chem major; SP—4701, chem major; A-F only) Lab experiments in inorganic/organometallic chemistry illustrating synthetic/spectroscopic techniques.

Chem 5011. Mechanisms of Chemical Reactions. (3 cr; QP—3303 or equiv; SP—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; QP—Chem grad or #; SP—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. (4 cr; QP—[3301, [5501 or 5534]] or #; SP—3501 or equiv 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; QP—#; SP—Graduate student or #; A-F only) 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. (4 cr; QP—[3302, 5502] or #; SP—\$MatS 5221; [2302, 3502] or #) Introduction to polymer chemistry. Condensation, radical, ionic, emulsion, ring-opening, and metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

Chem 5223W. Polymer Laboratory. (2 cr; QP-5610 or #; SP-\$MatS 5223; [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; QP-Chem sr or grad or #; SP-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; QP-3302 or equiv; SP-2302 or equiv)

Fundamental concepts, reactions, reagents, structural/ stereochemical issues, and mechanistic skills for organic chemistry.

Chem 5322. Advanced Organic Chemistry. (3 cr; QP-3302 or equiv; SP-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; QP-3302 or #; SP-2302 or #, 5011 or 8011)

Fundamental concepts and mechanistic tools for analysis of organic reaction mechanisms. Topics include solvation, reactive intermediates, gas phase chemistry, and photochemistry or strained-ring chemistry or both.

Chem 5361. Interpretation of Organic Spectra. (3 cr; QP-3302 or equiv; SP-2302 or equiv)

Application of nuclear magnetic resonance, mass, ultraviolet, and infrared spectral analyses to organic structural problems.

Chem 5411. Bioorganic Chemistry. (3 cr; QP-3302 or equiv; SP-2302 or equiv)

Chemistry of amino acids, peptides, proteins, lipids, carbohydrates, and nucleic acids. Structure, nomenclature, synthesis, and reactivity. Techniques to characterize biomolecules.

Chem 5412. Enzyme Mechanisms. (3 cr; QP-3302 or equiv; SP-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; QP-3302 or equiv; SP-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; QP-5702 or equiv, chem major or #; SP-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; QP-5702 or equiv, chem major or #; SP-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; QP-5702 or equiv, chem grad or #; SP-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; QP-5702, chem major, #; SP-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; QP-Chem grad student or #; SP-Chem grad student or #; A-F only)

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. Data 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. (4 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; SP-\$1105, 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. (4 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; SP-\$1106, 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. (1-3 cr [max 16 cr]; SP-#)

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; SP-\$ 3114; 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; SP-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; SP-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; SP-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.

Course Descriptions

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; SP–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]; SP–#)

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; QP–4 cr intro psych; SP–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; QP–1301, Psy 1001; SP–2301, Psy 1001; A-F only)

Techniques used in the study of child development; emphasis on collection, organization, and analysis of data.

CPsy 3360. Child Psychology Honors Seminar. (2 cr; QP–CPsy honors student; SP–CPsy honors student; A-F only)

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; QP–CPsy 1301 or #; SP–CPsy 2301 or #; A-F only)

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; QP–Psy 1001; SP–Psy 1001; A-F only)

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]; QP–1301; SP–Psy 1001; A-F only)

Topics/credits vary.

CPsy 4311. Behavioral and Emotional Problems of Children. (4 cr; QP–CPsy 1301 or equiv.; SP–Intro psych; A-F only)

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; QP–1301 or equiv.; SP–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; QP–1301 or equiv.; SP–2301 or equiv.; A-F only)

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; QP–CPsy 1301, Psy 1001; SP–CPsy 2301, Psy 1001; A-F only)

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; QP–1301; SP–2301; A-F only)

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 4336. Development and Interpersonal Relations. (4 cr; QP–CPsy 1301, CPsy 3331/5331; SP–CPsy 2301 or equiv., CPsy 4331; A-F only)

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; QP–1301; SP–2301)

Perceptual learning, development of sensory/perceptual processes.

CPsy 4343. Cognitive Development. (4 cr; QP–1301; SP–2301; A-F only)

Cognitive processes; relevant theory, research literature, and methodology.

CPsy 4345. Language Development and Communication. (4 cr; QP–CPsy 1301; SP–CPsy 2301; A-F only)

Structure and function of language; factors influencing development; methodological problems, language scales, theories.

CPsy 4993. Directed Instruction in Child Psychology. (1-4 cr [max 4 cr]; QP–#; 4 cr child psych; SP–#; 4 cr child psych; S-N only)

Students serve as teaching assistants in courses with the instructor's permission. Peer advising opportunities are also available for one credit or more per semester.

CPsy 4994. Directed Research in Child Psychology. (1-4 cr [max 4 cr]; QP–4 cr CPsy; SP–4 cr CPsy)

Individual empirical investigation. Undergraduates contribute significantly in the planning and implementing of scientific studies while gaining experience and expertise in the methodology of research.

CPsy 4994H. Directed Research in Child Psychology (Honors Thesis). (1-4 cr [max 4 cr]; QP–4 cr in CPsy; SP–4 cr in CPsy, CPsy honors)

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 4 cr]; QP–4 cr CPsy, #; SP–4 cr CPsy, #; S-N only)

Independent reading. Varies depending on student's specific area of interest. Students receive credit while interning in metropolitan area.

Chinese (Chn)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Chn 1011. Beginning Modern Chinese. (5 cr)

Speaking and reading modern standard Chinese through structured practice.

Chn 1012. Beginning Modern Chinese. (5 cr; SP–1011 or equiv or #)

Speaking and reading of modern standard Chinese through structured practice.

Chn 1015. Accelerated Beginning Modern Chinese. (5 cr; SP–Dialect background or prior experience)

Same content as Chn 1011–1012 concentrating on pronunciation and Chinese characters. For students with dialect background or prior experience.

Chn 3021. Intermediate Modern Chinese. (5 cr; SP–1012 or 1015 or equiv or #)

Modern standard Chinese skills developed further through conversations, writing, and reading.

Chn 3022. Intermediate Modern Chinese. (5 cr; SP–3021)

Modern standard Chinese skills developed further through conversation and reading.

Chn 3031. Advanced Modern Chinese. (4 cr; SP–3022 or equiv or #)

Reading and analysis of 20th-century texts.

Chn 3032. Advanced Modern Chinese. (4 cr; SP–3031 or equiv or #)

Reading and analysis of 20th-century texts.

Chn 3041. Business Chinese. (4 cr; SP–3032 or equiv or #)

Reading and analysis of commercial and business texts.

Chn 3111. Introductory Classical Chinese. (4 cr; SP–3022 or equiv or #)

Study of classical Chinese through reading and analysis of representative texts.

Chn 3112. Introductory Classical Chinese. (4 cr; SP–3111)

Study of classical Chinese through reading and analysis of representative texts.

Chn 3201. Chinese Calligraphy. (2 cr)

Appreciation and execution of Chinese calligraphy through guided practice.

Chn 3202. Intermediate Chinese Calligraphy. (2 cr; QP–3181 or #; SP–3202 or #)

Advanced techniques of composing Chinese characters using regular style of Chinese calligraphy.

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 4012. Chinese Traditional Literature in Translation II. (4 cr)

Representative works of Chinese literature in translation from the end of the T'ang dynasty until the end of the 19th century.

Chn 4023. 20th-Century Chinese Literature in Translation. (4 cr; SP–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; SP–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; SP–3111)

Sources and methods in the study of the historical development of the Chinese language.

Chn 4125. Structure of Modern Chinese. (4 cr; SP–3022 or equiv or #)

Analysis of the grammatical structures of modern standard Chinese.

Chn 4234. Chinese Poetry in Translation. (4 cr; SP–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; SP–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; SP-#, Δ, □)

Guided individual reading or study.

Chn 5011. Research Methods. (4 cr; SP-3032 or 3112)

Introduction to the sources and approaches of research in language and literature.

Chn 5015. Chinese Philosophical/Historical Texts. (4 cr; SP-3112)

Readings from major texts in Chinese philosophical and historical traditions.

Chn 5018. Chinese Religious Texts. (4 cr; SP-3112)

Traditional Chinese religious systems through selected texts.

Chn 5120. Topics in Chinese Linguistics. (4 cr [max 8 cr]; SP-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]; SP-3032)

Studies of representative literary works from May 4, 1919 to the present.

Chn 5240. Topics in Chinese Poetry. (4 cr [max 8 cr]; SP-3112)

Selected major Chinese poets and poetic forms.

Chn 5242. 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]; SP-3032 or 3112)

Studies of traditional and modern Chinese fiction.

Chn 5260. Topics in Pre-modern Chinese Prose. (4 cr [max 8 cr]; SP-3112)

Studies of representative Chinese prose writings of the pre-modern period.

Chn 5393. Directed Study. (1-5 cr [max 18 cr]; SP-#, 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; QP-BCE or equivalent degree or completion of Parts I and II of the State Board Examination; SP-BCE or equivalent degree or completion of Parts I and II of the State Board Examination; S-N only)

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; QP-CE, GeoE student, Math 1261; SP-CE, GeoE student, Math 1272; A-F only)

Introduction to computer tools and methods for solving civil engineering problems. Tools include spreadsheets, Autocad, Mathcad, and Visual Basic. Methods can include numerical integration, curve fitting, linear and nonlinear equations, and differential equations.

CE 3201. Transportation Engineering. (3 cr; QP-IT, Phys 1251; SP-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; QP-IT, Math 1251; SP-IT or #; Math 1271, 1272; A-F only)

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; QP-IT, AEM 3016; SP-IT, AEM 3031; A-F only)

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; QP-Upper div IT or grad, 3300; SP-IT, AEM 3031; A-F only)

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; QP-IT or grad, AEM 3016; SP-IT, AEM 3031; A-F only)

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; QP-Upper div IT, AEM 3016; SP-Upper div IT, AEM 3031; A-F only)

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 3501. Environmental Engineering. (3 cr; QP-IT, Chem 1052, Phys 1253; SP-Chem 1022, Phys 1302; A-F only)

Introduction to environmental engineering. Quantitative approach to environmental problems. Scientific background for understanding roles of engineers and scientists.

CE 3502. Fluid Mechanics. (4 cr; QP-IT or WPS major, Math 3261, AEM 1015 or AEM 3016; SP-IT or ForP major, Math 2243, AEM 2012 or AEM 2301; A-F only)

Fluid statics and dynamics. Kinematics of fluid flow, equations of motion, pressure-velocity relationships, viscous effects, boundary layers. Momentum and energy equations. Lift and drag. Flow in pipes and pipe systems. Hydraulic machinery. Fluid measurements.

CE 4101W. Project Management. (3 cr; QP-Upper div IT; SP-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; QP-CE sr; SP-CE sr; A-F only)

Teams formulate and 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;

QP-Upper div IT or grad; SP-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; QP-CE or upper div GeoE, 3020, Math 3251, Math 3252; SP-CE or upper div GeoE, 3101, Math 2243, Math 2263; A-F only)

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]; QP-#; May be taken more than once; SP-#)

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]; QP-#; May be taken more than once; SP-#)

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. (4-6 cr; QP-Upper div CE, #; SP-Upper div CE, approval of department co-op director; S-N only)

Formal written report of work during six-month professional assignment.

CE 4201. Highway Design. (3 cr; QP-IT or grad, 3200 or #; SP-CE or upper div GeoE or grad, 3202, 3201 or #; A-F only)

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; QP-IT or grad, 3300, 5603; SP-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; QP-Upper div IT or Grad, 5603; SP-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; QP-Upper div IT or grad, 3300; SP-Upper div IT, CE 3301, GeoE 3301 or #; A-F only)

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.

CE 4311. Rock Mechanics II. (3 cr; QP-IT or grad in IT major, GeoE 5302 or #; SP-Upper div IT or grad in IT major, CE 3311, GeoE 3311 or #; A-F only)

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; QP-CE or GeoE or Geo sr or grad, Stat 3091 or #; SP-CE, GeoE or upper div GeoE or grad, Stat 3021 or #; A-F only)

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; QP-IT or grad, 3400 or #; SP-Upper div IT or grad, CE 3502 or #; A-F only)

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; QP-IT or grad, 5425 or #; SP-Upper div IT or grad, CE 4351, GeoE 4351 or #; A-F only)

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; QP-Upper div IT or Grad, 5600, 5603; SP-Upper div IT or grad, C or better in 3401/3402; A-F only)

Limit-states design. Steel: tension, compression, flexure, combined compression and flexure, connections. Concrete: beams in flexure and shear, one-way slabs, T-beams, development length, serviceability.

CE 4411. Matrix Structural Analysis. (3 cr; QP-Upper div IT or grad, 5600; SP-Upper div IT or grad, 3401 or #; A-F only)

Analysis of linear structural systems by matrix methods, stiffness and flexibility methods. Introduction to computerized structural analysis of trusses and frames, including coding in a programming language.

Course Descriptions

CE 4412. Reinforced Concrete Design II. (3 cr; QP–IT or grad, 5611; SP–Upper div IT or grad, C or better in 4401 or #; 4411 recommended; A-F only)

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; QP–IT or grad, 5610; SP–Upper div IT or grad, C or better in 4401 or #; 4411 recommended; A-F only)

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; QP–IT or grad, 3400 or #; SP–3502; A-F only)

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; QP–IT or grad, 3400, Chem 1052 or #; SP–3501; A-F only)

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; QP–IT or grad, 5401 or #; SP–4501; A-F only)

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; QP–IT or grad, 3400, 5401 or #; SP–IT or grad, 3502 or #; A-F only)

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; SP–3501, ¶4541; A-F only)

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; SP–3501, Chem 1021, Chem 1022; A-F only)

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; QP–3500; SP–Upper div, 3501; A-F only)

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; QP–IT or grad, Chem 1052 or #; SP–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; QP–[IT or grad], 5401, 5501] or #; SP–[3501, 4501] or #; A-F only)

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 5211. Traffic Engineering. (3 cr; QP–IT or grad, 3200; SP–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; QP–IT or grad, 3200, #; SP–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 5231. Pavement Management and Rehabilitation. (3 cr; QP–Upper div IT or grad, 5603; SP–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; SP–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; SP–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; QP–Upper div IT or grad, 5603; SP–Upper div IT or grad, 4301, GeoE 4301 or #; A-F only)

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; QP–Upper div IT or grad; SP–Upper div IT or grad, 4301 or GeoE 4301; A-F only)

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; QP–Upper div IT or grad, 3300; SP–Upper div IT or grad, 4301 or #; A-F only)

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; QP–Upper div IT or grad, 5600, AEM 3036; SP–Upper div IT or grad, C or better in 4401 or #; A-F only)

Principal stresses and failure criteria in 3 dimensions. Introduction to plane elasticity, energy methods, torsion of beams, bending of unsymmetrical beams.

CE 5412. Prestressed Concrete Design. (3 cr; QP–IT or grad, 5611, 5612; 5613 recommended; SP–Upper div IT or grad, C or better in 4401 or #; 4412 recommended; A-F only)

Design of prestressed concrete structures. Time dependent effects, behavior, flexure, shear, torsion, deflections, continuous systems.

CE 5413. Masonry Structures. (3 cr; QP–IT or grad, 5600 or #; SP–Upper div IT or grad, C or better in 3401 or #; 4401 recommended; A-F only)

Masonry materials and their production; mortars and grouts; design of unreinforced, reinforced, and prestressed masonry structural systems; walls; columns; lintels; arches. Codes and specifications, testing and inspection.

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; QP–Upper div IT or grad or #; SP–Upper div IT or grad or #; A-F only)

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 (CICv)

Department of Classical and Near Eastern Studies College of Liberal Arts

CICv 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.

CICv 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.

CICv 3340. Practicum in Archaeological Field and Computer Techniques. (3 cr; SP–CICv 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.

CICv 3510. Great Books. (3 cr [max 9 cr]; SP–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.

CICv 3711. Classics of Literary Criticism. (3 cr; SP–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

CICv 3940. Proseminar: Classical Traditions in Western Culture. (3-4 cr [max 6 cr]; SP–CICv 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.

CICv 3950. Topics in Classical Civilization. (3-4 cr [max 9 cr])

Topics specified in the *Class Schedule*.

CICv 3993. Directed Studies in Classical Civilization. (1-4 cr)

CICv 3994. Directed Research in Classical Civilization. (1-4 cr)

CICv 3996. Directed Instruction 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; SP-\$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; SP-\$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; SP-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; SP-\$1082, §1182, §RelA 1082, §RelA 1182; 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 1142H. Honors Course: Greek and Roman Mythology. (4 cr; SP-Honors student or #)

Introduction to the stories and the study of Greek and Roman mythology.

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; SP-\$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; SP-\$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; SP-\$3072; 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; SP-\$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; SP-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; SP-CIV 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]; SP-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*.

Course Descriptions

Clas 3993. Directed Studies. (1-4 cr [max 18 cr])
Guided individual reading or study.

Clas 5001. Classical Lyric and Satire. (3 cr; SP-#13001,
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; SP-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;
SP-#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; SP-#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; SP-#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; SP-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;
SP-#13081)
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;
SP-#13082)
Origins of tragedy; ancient theatres; selected plays of
Aeschylus, Sophocles and Euripides.

Clas 5083. Ancient Comedy. (3 cr; SP-#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; SP-#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; SP-#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; SP-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; SP-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; SP-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; SP-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 Periclean Athens.

Clas 5120. Field Research in Archaeology. (3 cr; SP-#)
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; SP-#3145; 1042 or #)
Different theoretical approaches to Greek/Roman
mythology.

**Clas 5172. House, Villa, Tomb: Roman Art in the
Private Sphere.** (3 cr; SP-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; SP-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 5252. History of Early Christian Art in Context.
(3-4 cr; SP-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; SP-#3340; CICv 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; SP-Grad major or minor or #; S-N only)
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]; SP-#3940; 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;
SP-#3950)
Topics specified in *Class Schedule*. Meets with 3950.

Clas 5993. Directed Studies. (1-4 cr; SP-#, Δ, □)
Guided individual reading or study.

Clas 5994. Directed Research. (1-12 cr; SP-#, Δ, □)

Clas 5996. Directed Instruction. (1-12 cr; SP-#, Δ, □)

Clinical Laboratory Science (CLS)

*Department of Laboratory Medicine and
Pathology*

Medical School

**CLS 5064. Introduction to Clinical
Immunohematology.** (2 cr; SP-#; A-F only)
Principles of blood grouping, antibody identification,
compatibility testing, serology, and immunology.

**CLS 5065. Introduction to Clinical
Immunohematology: Laboratory.** (2 cr; SP-#; A-F only)
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; SP-#;
A-F only)
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; SP-Microbiology course
with lab, biochem course; A-F only)
Lab diagnosis of viral, fungal, and parasitic infections.
Lecture.

CLS 5102. Principles of Diagnostic Microbiology. (4 cr;
SP-Microbiology course with lab, biochem course.
Instructor consent required; A-F only)
Techniques in lab diagnosis of infectious disease.
Isolation/identification of bacteria/yeasts.
Antimicrobial susceptibility testing. Lecture, lab.

CLS 5120. Seminar: Clinical Laboratory Science. (1 cr
[max 3 cr]; SP-#; S-N only)
Current literature. Presentation/discussion of research.

CLS 5121. Journal Presentations. (1 cr [max 2 cr];
SP-1st yr CLS grad student; S-N only)
Critical analysis, evaluation, discussion of current
journal articles in student's specialty area.

CLS 5125. Practicum Teaching. (1-2 cr; SP-#; A-F only)
Supervised teaching experience, develop skills using
instructional materials, tests, and measurements.

**CLS 5127. Introduction to Management and
Education I.** (1 cr; SP-#; A-F only)

**CLS 5128. Introduction to Management and
Education II.** (1 cr; SP-5127, MedT 4127; A-F only)

CLS 5129. Elements of Laboratory Administration.
(2 cr; SP-#; A-F only)
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; SP-#; A-F only)
Supervised experience and assignment of specific
problems related to lab service and management in
health care institutions.

CLS 5135. Advanced Clinical Microbiology. (3 cr; SP-#)
Observation, study, and practice in special problems,
advanced techniques, and methodology.

CLS 5140. Techniques for Teaching. (2 cr; SP-#;
A-F only)
Developing objectives, classroom activities, and
evaluation criteria for medical technology education.

CLS 5155. Advanced Clinical Hematology. (3 cr; SP-#)
Observation, study, and practice in special problems,
advanced techniques, and methodology.

CLS 5165. Advanced Clinical Immunohematology.
(3 cr; SP-#)
Observation, study, and practice in special problems,
advanced techniques, and methodology.

CLS 5175. Advanced Clinical Chemistry. (3 cr; SP-#)
Observation, study, and practice in special problems,
advanced techniques, and methodology.

CLS 5251. Hematology I: Basic Techniques. (3 cr; SP-#, A-F only)

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; SP-5251 or MedT 4251; A-F only) 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; SP-5251 or MedT 4251; A-F only)

Theory and application of specific concepts and techniques in hemostasis and coagulation. Lecture and lab.

CLS 5310. Clinical Chemistry I: Lecture. (2 cr;

SP-Organic chem course with lab; biochem course, #; A-F only)

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; SP-One organic chemistry course with laboratory; one biochemistry course, #; A-F only) 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;

SP-Organic chem course with lab, biochem course, 5310 or MedT 4310, #; A-F only)

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; SP-Organic chem course with lab, biochem course, 5310 or MedT 4310, #; A-F only) 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]; SP-#)

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]; SP-#, S-N only)

Departmental research seminar series.

CLS 5865. Departmental Seminar. (1 cr [max 10 cr]; SP-#, S-N only)

Departmental clinical lab research seminar series.

College of Liberal Arts (CLA)

College of Liberal Arts

CLA 1050. Faculty Mentor Freshman Seminar. (2 cr; QP-A, Faculty Mentor Program; SP-A, Faculty Mentor Program; A-F only)

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; SP-SEAM; A-F only)

Exploration of issues related to students' academic/career interests. Multiculturalism, other skills. Small-group discussions.

CLA 1302. SEAM First-Year Colloquium. (2 cr; SP-SEAM; A-F only)

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, 1096W. Topics:

Freshman Seminar. (1-4 cr; QP-Fr or no more than 36 cr; SP-Fr or no more than 36 cr; A-F only)

Interdisciplinary seminar. Topics specified in *Class Schedule*.

CLA 1907W, 1908W, 1909W, 1910W. Topics: Freshman

Seminar. (1-4 cr; QP-Fr with no more than 36 cr; SP-Fr with no more than 24 cr; A-F only)

Interdisciplinary seminar. Topics specified in *Class Schedule*.

College of 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; QP-Biol 1009 or [Biol 1001, Biol 1002]; SP-Biol 1009; A-F only)

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)

Processes and impairments of human oral communication. Fluency, phonology, voice disorders including laryngectomy, cleft palate, language disorders, augmentative communication, hearing and hearing impairment. Identification and intervention strategies.

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. (3 cr; QP-5301, 5302, 5303 or #; SP-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; QP-5301, 5302 or #; SP-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 3401W. 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 3402W. Major Project in Speech and Hearing

Science. (3 cr; QP-Jr or sr CDIs major; SP-Jr or sr CDIs major; S-N only)

Seminar for completion of the undergraduate major project paper by students in their junior or senior years.

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; QP-5302 or #; SP-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; QP-5305 or #; SP-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; QP-[5301, 5302] or #; SP-[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; QP-5304, 5701 or #; SP-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; QP-1304 or #; SP-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; QP-#, SP-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.

Course Descriptions

CDIs 5501. Fluency Disorders. (3 cr; QP-#; SP-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; QP-#; SP-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; QP-#; SP-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; QP-5509 or #; SP-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; QP-#; SP-3304, 4601 or #)
Theory and research related to the nature, assessment, and treatment of phonological disorders in children.

CDIs 5603. Communication Assessment and Intervention: Preschoolers and Persons With Severe Disabilities. (3 cr; QP-#; SP-4601 or #)
Assessment and intervention options for school age children with communication delays or disorders and for older individuals who experience severe developmental disabilities.

CDIs 5604. Language Assessment and Intervention: School Age Children. (3 cr; QP-#; SP-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; QP-#; SP-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; QP-#; SP-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; QP-5611 or #; SP-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; QP-5701 or #; SP-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; QP-5304, 5701 or #; SP-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; QP-5701 or #; SP-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 cr; QP-5701 or #; SP-4801 or #)
Intensive study of clinical methods in audiology. Designed to supplement didactic courses in the audiology curriculum; enhance skills through laboratory study individually or in small groups.

CDIs 5900. Topics: Communication Disorders. (2 cr)
Topics listed in Communication Disorders office.

CDIs 5993. Directed Study. (1-12 cr [max 18 cr]; QP-#; SP-#)
Directed readings and preparation of reports on selected topics.

Comparative Literature (CLit)

Department of Cultural Studies and Comparative Literature

College of Liberal Arts

CLit 5331. Discourse of the Novel. (3 cr; SP-SCSCL 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; SP-SCSCL 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; SP-SCSCL 5751, SCSDS 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]; SP-#)
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; SP-SCSCL 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; SP-SCSCL 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; SP-SCSCL 5751, SCLit 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]; SP-#)
Guided individual reading and study.

Computer Science (CSci)

Department of Computer Science

Institute of Technology

CSci 1101. Introduction to Computing and Problem Solving. (3 cr)

Problem solving and introduction to programming. Students write simple programs in pseudocode and in one or more programming languages (such as Java, C++ or Scheme). Assumes no programming background and is good preparation for CSci 1113.

CSci 1103. Introduction to Computer Programming in Java. (3 cr)

For students who have no programming knowledge. Introduction to object-oriented programming concepts using Java.

CSci 1107. Introduction to FORTRAN Programming for Scientists and Engineers. (3 cr; QP-Math 1251 or Math 1351 or #; SP-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; QP-Math 1251 or Math 1351; SP-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)

How to navigate/search for information on the Web, build Web pages. How use markup languages (HTML), e-mail, file transfer (ftp), remote session (Telnet), and newsgroups. How to program Internet-based client-server applications using current technologies (CGI, SSI, Web server APIs). Programming concepts for publishing dynamic contents.

CSci 1901. Structure of Computer Programming I. (4 cr; QP-¶Math1271 or equiv; fr or soph or jr or #; SP-¶Math1271 or equiv; fr or soph or jr 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; QP-3317; SP-[1901, [fr or soph or jr]] 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; QP-Math 1252 or Math 1352; SP-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; QP-3321; SP-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; QP–Math 3261; SP–Math 2243 or #; SSci 5301)
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; QP–At least soph; SP–\$2109; 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-WI). (3 cr; QP–At least soph; SP–\$2101; 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; SP–1121; A-F only)
Conceptual data modeling, entity-relationship (ER) model. Relational data model. Querying data using standard query language (e.g., SQL). Interfacing Web/databases. Modeling Web information. Managing Web-based information servers. E-commerce as significant application. Case studies. Emerging trends (e.g., XML).

CSci 2980. Special Topics in Computer Science. (1-4 cr [max 1 cr]; QP–#, SP–#, A-F only)
Special topics. Lectures, informal discussions.

CSci 3970. Industrial Student Co-op Assignment. (2 cr [max 8 cr]; QP–CSci, in coop program; SP–CSci, in coop program; S-N only)
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]; QP–Upper div CSci; can be repeated for cr; SP–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; QP–3311 and 3321; SP–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; QP–3311 and 3321; SP–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; QP–3327; SP–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; QP–3311, 3321; SP–\$5801; \$4089; [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-WI). (4 cr; QP–3311, 3321; SP–\$5801, \$4081; [1902, 2011] or #; no cr for grads in CSci)
Basic theory/practice of software engineering. Software development, requirements/specifications, design, verification, and validation.

CSci 4921. History of Computing. (3 cr; QP–\$HSci 5321; SP–\$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]; QP–5102, #; SP–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; QP–5102; SP–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; QP–3322, 3327; SP–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. Computer Graphics. (3 cr; QP–3322; SP–4041 or #)
Introduction to theory and practice of graphics programming. Graphics programming fundamentals; overview of 2D graphics and algorithms, 3D modeling and rendering techniques, animation, and scientific visualization. Graphics language currently used is OpenGL.

CSci 5108. Computer Graphics II. (3 cr; QP–\$5117; 5107 or #; SP–5107 or #)
Advanced modeling/rendering. Curves/surfaces, constructive solid geometry, radiosity, advanced ray tracing, texture, shadows, and other surface detail. Animation. Introduction to scientific visualization. Current topics in computer graphics.

CSci 5115. User Interface Design, Implementation and Evaluation. (3 cr; QP–3322; SP–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; QP–5107 or 5110; SP–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. Internet Programming. (3 cr; QP–5106 or 5211; 5180, 5702 recommended; SP–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; QP–5106; SP–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; QP–3327; SP–2021 or #; SEE 5361)
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; QP–5102; SP–4061 or #)
Fundamental concepts, principles, protocols, and applications. Layered network architectures, data link protocols, local area networks, routing, transport, congestion/flow control, emerging high-speed networks, network programming interfaces, management, security, and applications. Ethernet, ATM, TCP/IP, HTTP and WWW. Basic knowledge of computer architecture and operating systems is recommended.

CSci 5212. Network Programming and Administration. (3 cr; QP–5211; SP–5211 or #)
Network and distributed programming concepts using C, C++, or Java on UNIX or PC platforms. TCP/IP, sockets, and RPC. Hands on experience with network components. Students plan, configure, install, diagnose, performance tune, operate, and manage state-of-the-art computer networks, internetworking devices, and protocols.

CSci 5283. Computer-Aided Design I. (3 cr; QP–3327; SP–2021 or #)
CAD for digital systems. Emphasizes VLSI. Hardware description languages, synthesis, simulation, test generation.

CSci 5285. Computer-Aided Design of VLSI. (3 cr; QP–3327; SP–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 5301. Numerical Analysis. (3 cr; QP–Math 3261; SP–Math 2243 or #; \$2031)
Fundamentals of numerical analysis. Differs from 2031 by covering different set of topics and in more detail. Floating point arithmetic and roundoff error, linear/nonlinear equations, matrix eigenvalue problems, linear programming.

CSci 5302. Analysis of Numerical Algorithms. (3 cr; QP–5301; SP–5301 (preferred) or 2031 or #)
Additional topics in numerical analysis: interpolation, approximation, extrapolation, numerical integration and differentiation, numerical solutions of ordinary differential equations.

CSci 5304. Computational Aspects of Matrix Theory. (3 cr; QP–5302; SP–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 5315. Numerical Methods for ODEs. (3 cr; QP–5302; SP–5302 or #)
Initial and boundary value problems. Runge-Kutta, multistep, and extrapolation methods. Basic theory for convergence, order, and stability. Mathematical software. Solution methods based on shooting, multiple shooting, and collocation techniques. Application of methods and theory from numerical ODEs to the solution of PDEs via the method of lines.

CSci 5403. Computational Complexity. (3 cr; QP–5400; SP–4041 or #)
Computational models, complexity measures in each model, and related complexity classes.

CSci 5421. Advanced Algorithms and Data Structures. (3 cr; QP–3322; SP–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 5442. Computational Geometry and Applications. (3 cr; QP–5421; SP–5421 or #)
Designing efficient algorithms and data structures for geometric problems; models of computation, convex hulls, geometric duality, multidimensional search, Voronoi diagrams and Delaunay triangulations, linear programming in fixed dimensions, lower bound techniques. Applications and advanced topics.

Course Descriptions

CSci 5451. Introduction to Parallel Computing: Architectures, Algorithms and Programming. (3 cr; QP-3322; SP-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 5511. Artificial Intelligence I. (3 cr; QP-3311; SP-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; QP-5511; SP-\$5519; 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-WI). (3 cr; QP-5511; SP-\$5512; 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; QP-5301, Stat 3091; SP-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; QP-5511; SP-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; QP-5511; SP-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 5571. Expert Systems. (3 cr; QP-5511; SP-5511 or #)

Introduction to ideas and issues of expert systems. Knowledge representation, problem-solving, search, inference techniques, theorem proving. Use of an expert system shell.

CSci 5707. Principles of Database Systems. (3 cr; QP-3322; SP-4041 or #)

Fundamental concepts. Data Models. Data manipulation languages. Extending data types. Database design. Security and integrity policy. Techniques of using database systems for applications. Application of these concepts in the design and development of database applications.

CSci 5708. Architecture and Implementation of Database Management Systems. (3 cr; QP-5702; SP-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; QP-5106; SP-2011, 1902 or #; \$4081.)

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; QP-5180; SP-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]; QP-#: SP-#)

Lectures and informal discussions on current topics in computer science.

CSci 5991. Independent Study. (1-3 cr [max 9 cr]; QP-#: may be repeated for cr; SP-#: may be repeated for cr) Independent study arranged with CS faculty member.

CSci 5994. Directed Research. (1-3 cr [max 9 cr]; QP-#: may be repeated for cr; SP-#: may be repeated for cr) Directed research arranged with faculty member.

CSci 5996. Curricular Practical Training. (1 cr [max 3 cr]; SP-#: may be repeated for cr; S-N only)

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. Construction and Society. (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; SP-Technical writing course [available at North Hennepin or Inver Hills Community College] or equiv or #; primarily for BCM students or those working in construction industry)

Definition, interpretation, drawings, specifications, agreements, bidding forms, general conditions, bonds, contracts, subcontracts, related documents.

CMgt 4012. Risk Management, Bonds, and Insurance. (2 cr)

Primarily for students in the BCM program or those working in construction. How to recognize and evaluate property, liability, health, and financial risks associated with construction projects. Risk control and financing. Insurance marketing, pricing, surety bond underwriting and financial analysis, and claims administration.

CMgt 4013. Legal and Ethical Issues in Construction. (2 cr; QP-4011, [BCM or upper div or working in construction industry]; SP-4011, [BCM or upper div or working in construction industry])

Role of construction management professional in society. Principles of conduct. Goals in professional performance/behavior. Review of mandatory requirements.

CMgt 4015. Introduction to Digital Technologies in the Construction Industry. (2 cr; SP-[Computer literacy, upper div construction management degree] recommended; A-F only)

Role of information technology in the construction industry. Current/future uses of technology by owners, general contractors, subcontractors, facilities management personnel. Networking, databases, wireless communication, software selection, Web-based project management, online plan rooms.

CMgt 4016. Construction Software. (2 cr; QP-4015 recommended; SP-4015 recommended; A-F only) Selection/use of construction software. Estimating, accounting, project management, scheduling, database software. Hands-on, workshop environment.

CMgt 4017. Web-based Project Management. (2 cr; QP-4015 recommended; SP-4015 recommended; 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.

CMgt 4018. Digital Communication Technologies. (2 cr; QP-4015 recommended; SP-4015 recommended; A-F only)

Digital technologies in the construction industry. Wired/wireless communication, online plan/bid rooms, mobile computing, video conferencing.

CMgt 4021. Construction Planning and Scheduling. (2 cr; QP-CMSV 2860 [available through NHCC]; SP-CMSV 2860 [available through NHCC])

Project planning, scheduling, 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; SP-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; QP-\$4022, \$4023; CMSV 2860 [available at NHCC]; SP-\$4022, \$4023; CMSV 2860 [available at NHCC]; A-F only) 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 4030. Construction Safety and Loss Control. (2 cr; QP-Upper div; SP-Upper div; A-F only)

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; QP-4011; SP-4011)

Research, analysis, development of written construction documentation. Bidding/contract document relationships. Project manual preparation. Cost evaluation of building components. Quality-assurance methodology.

CMgt 4193. Directed Study. (1-4 cr; SP-Δ) Topic arranged with BCM academic adviser.

CMgt 4196. Construction Management Internship. (3-4 cr [max 12 cr]; QP-BCM Student; SP-BCM Student)

Professional experience internship requirement for BCM program. Subject to faculty adviser approval.

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; SP-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 1101W. 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 1201W. Visual Culture. (4 cr)

Introduction to role of visual practices. Film, photography, advertising, video/TV, public spectacle, new media (digital, virtual, hypertext), built environment in cultures past/present, American/worldwide. How does the visual articulate identity, family, community, sexuality, status, race, gender, ethnicity, nation?

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 1905. Freshman Seminar. (3 cr; SP-Fr or no more than 36 cr; A-F only)
Topics specified in *Class Schedule*.

CSCL 1907W. Freshman Seminar. (3 cr; SP-Fr or no more than 36 cr; A-F only)
Topics specified in *Class Schedule*.

CSCL 1910W. Freshman Seminar. (3 cr [max 6 cr]; SP-Fr or no more than 36 cr; A-F only)
Topics specified in *Class Schedule*.

CSCL 1921W. Introduction to Film Study. (4 cr; SP-\$Arth 1921)

Fundamentals of film analysis, major theories of cinema. Detailed interpretations of representative films from international history of cinema.

CSCL 3000. Topics. (1 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 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; SP-\$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 3421W. 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 3422W. Culture and the Production of Modern Identity II: 1750-1900. (3 cr)

History of cultural, perceptual and/or conceptual changes in Western societies, 1750 to 1900, 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. Sexualities - From Perversity to Diversity. (3 cr)

Historical and critical study of forms of modern sexuality (heterosexuality, homosexuality, romance, erotic domination, lynching). How discourses constitute and regulate sexuality. Materials include scientific and 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 sign for production of social and cultural difference (race, ethnicity, class, gender). Visual arts, literature, music, medical treatises, courtesy literature, erotica.

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 3631. Jewish Writers and Rebels in German, Austrian, and American Culture. (3 cr; SP-\$Ger 3631, \$JwSt 3631; 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 3910. Topics in Cultural Studies and Comparative Literature. (3 cr)

Topics specified in *Class Schedule*.

CSCL 3944H. Honors Thesis. (3 cr; SP-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 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.

Course Descriptions

CSCS 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.

CSCS 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.

CSCS 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.

CSCS 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.

CSCS 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).

CSCS 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.

CSCS 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.

CSCS 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.

CSCS 5835. Richard Wagner's "Der Ring des Nibelungen": Music, Myth, and Politics. (3 cr; SP-#)

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.

CSCS 5910. Topics in Cultural Studies and Comparative Literature. (3 cr [max 24 cr])

Topics specified in *Class Schedule*.

CSCS 5993. Directed Study. (1-3 cr [max 9 cr])

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 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; SP-Jr or sr or #; A-F only)

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.

CI 5111. Introduction to Elementary School Teaching. (3 cr; SP-Foundations of ed major or elem ed initial lic; A-F only)

Curriculum organization, instruction, management, assessment, professional decision making.

CI 5183. Applying Instructional Methods in the Elementary Classroom. (1-2 cr [max 8 cr];

SP-Foundations of ed major or elem ed initial licensure only; S-N only)

Supervised experience in elementary classrooms.

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; SP-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]; SP-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]; SP-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; SP-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]; SP-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]; SP-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; SP-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]; SP-1202, Δ)

Jazz technique; body isolations, placement, and musicality.

Dnce 1220. Jazz Technique 4. (1 cr [max 2 cr]; SP-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; SP-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; SP-1311, Δ)

Continuation of 1311. Basic folk steps including the schottische, polka, waltz, and grapevine; technical emphasis on footwork and partnering.

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; SP-1321, Δ)

Continuation of 1321. Elementary steps of the foxtrot, waltz, swing, cha-cha, rumba, tango, mamba, and bolero. Partnering, style, and phrasing.

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; SP-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 1626. Music for Dance. (3 cr; SP-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]; SP-1020, Δ)

Application of principles of space, time, and energy. Alignment, power from pelvic center, rotation/turnout, muscular tonality, joint articulation, clarity of intent, stretch, strength, and stamina.

Dnce 3020. Modern Dance Technique 6. (2 cr [max 4 cr]; SP-3010, Δ)

Continuation of 3010. Application of principles of space, time, and energy. Alignment, power from pelvic center, rotation/turnout, muscular tonality, joint articulation, clarity of intent, stretch, strength, and stamina.

Dnce 3110. Ballet Technique 5. (2 cr [max 4 cr]; SP-1120, Δ)

Continuation of beginning technique. Stretch, strength, balance, and musicality; longer phrases in adagio and allegro work; more complex elevations in petit allegro; practical work is conducted in context of study of technical development of ballet.

Dnce 3120. Ballet Technique 6. (2 cr [max 4 cr]; SP-3110, Δ)

Continuation of 3110. Ballet technique. Stretch, strength, balance, and musicality; longer phrases in adagio and allegro work; more complex elevations in petit allegro.

Dnce 3210. Jazz Technique 5. (1 cr [max 2 cr]; SP-1220, Δ)

Continuation of jazz technique. Rhythm structures, longer phrases and greater physical speed, attack and control.

Dnce 3220. Jazz Technique 6. (1 cr [max 2 cr]; SP-3210, Δ)

Continuation of 3210. Jazz technique. Rhythm structures, longer phrases and greater physical speed, attack and control.

Dnce 3301. Tap Technique 3. (1 cr; SP-1302 or #)

Tap techniques and creative development through improvisational studies.

Dnce 3302. Tap Technique 4. (1 cr; SP–3301 or #)
Tap techniques and rhythm structures.

Dnce 3401. Dance History 1. (3 cr)
History/theory of dance in varied forms and aspects. From origins of dance as movement-form, through early Renaissance. First half of a yearlong survey.

Dnce 3402. Dance History 2. (3 cr)
History/theory of dance in varied forms/aspects. From development of ballet, through twentieth century modern dance. Second half of yearlong survey.

Dnce 3433. Articulate Body. (3 cr; SP–Dnce major or minor, Δ)
Lectures and movement sessions in biodynamic considerations for optimal dance performance and metabolic demands of dance.

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 3500. Topics in Dance. (1-2 cr [max 10 cr])
Topics specified in *Class Schedule*.

Dnce 3601. Dance Composition 1. (3 cr; SP–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; SP–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 3700. Performance. (2 cr; SP–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 4443. Philosophy and Aesthetics. (3 cr; SP–1401)
Major developments in Western philosophic thought on dance and dance theory from its beginnings to the present.

Dnce 4487. 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 4601. Dance Composition 3. (3 cr; SP–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; SP–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. (1 cr [max 2 cr]; QP–Sr, [Dnce or Th major]; SP–Sr, [Dnce or Th major]; S-N only)
Development of senior project under guidance of faculty. To complete course, students must register for 1 credit fall and 1 credit spring in same academic year

Dnce 5010. Modern Dance Technique 7. (3 cr [max 6 cr]; SP–3020, Δ)
Continuation of technical development. Performance range and style. Students study with various guest artists.

Dnce 5020. Modern Dance Technique 8. (3 cr [max 4 cr]; SP–5010, Δ)
Continuation 5010 and modern technique. Performance range and style. Students study with various guest artists.

Dnce 5110. Ballet Technique 7. (2 cr [max 4 cr]; SP–3120, Δ)
Continuation of ballet technique. Musicality, performance, and stylistic differences. Practical work conducted within context of choreographic and aesthetic development of ballet.

Dnce 5120. Ballet Technique 8. (2 cr [max 4 cr]; SP–5110, Δ)
Continuation of 5110. Ballet technique; musicality, performance, and stylistic differences. Practical work conducted within context of choreographic and aesthetic development of ballet.

Dnce 5210. Jazz Technique 7. (1 cr [max 2 cr]; SP–3220, Δ)
Continuation of jazz technique. Syncopation, performance projection, and specific jazz styles: swing, bebop, lyrical, funk, latin.

Dnce 5220. Jazz Technique 8. (1 cr [max 2 cr]; SP–5210, Δ)
Continuation of 5210. Syncopation, performance projection, and specific jazz styles: swing, bebop, lyrical, funk, latin.

Dnce 5500. Topics in Dance. (1-2 cr [max 10 cr])
Topics specified in *Class Schedule*.

Dnce 5700. Performance. (2 cr [max 18 cr]; SP–[technique course, Δ)
Technique, improvisation, choreography, music, design, and technical production as they relate to dance performance.

Dnce 5858. Teaching Dance. (4 cr; SP–1020, Δ or #)
Methods, principles, and techniques of teaching dance.

Dnce 5970. Directed Studies. (1-4 cr [max 10 cr]; SP–#, Δ, □)
Guided individual study.

Danish (Dan)

*Department of German, Scandinavian, and Dutch
College of Liberal Arts*

Dan 1001. Beginning Danish. (4 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. (4 cr; SP–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. (4 cr; SP–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. (4 cr; SP–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; SP–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; SP–Passing score on GPT)
Discussion of novels, short stories, plays, articles complemented by structural, stylistic, vocabulary building exercises.

Dan 4001. Beginning Danish. (2 cr; SP–\$1001, 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; SP–\$1002, 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; SP–\$1003, 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; SP–\$1004, 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 skulls.

DH 1191. Dental Hygiene Care Process. (6 cr; SP–\$1190: A-F only)
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]; S-N only)
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)
Oral hygiene techniques implemented through communication between patient and oral health care provider. Co-therapeutic problem solving.

Course Descriptions

- 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 2232. 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 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 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; SP-; A-F only)
Principles of diet and nutrition applied to dental hygiene patient care; skills in dental dietary counseling.
- DH 3133. Pharmacology.** (2 cr; SP-A; A-F only)
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]; S-N only)
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, complications, emergency management, and legal and ethical considerations. Lecture, lab, and clinic.
- DH 3224. 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 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 3231. 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 4125. 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 4132. 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]; S-N only)
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; S-N only)
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; S-N only)
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 4292. Educational Philosophy and Program Planning.** (1-4 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.** (1-4 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.** (1-4 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.** (1-4 cr)
Individual and/or group study; student(s) select courses/workshops based on individual needs and interests.
- DH 4296. Special Topics.** (1-4 cr)
Students select topics of current interest from continuing education or other courses based on individual needs.
- DH 4297. Topics in Interdisciplinary Health Care.** (1-4 cr)
Individual and/or group study on selected topics related to diversity, cross-cultural health, and interdisciplinary health care.
- DH 4298. Dental Hygiene Process of Care: Clinical Application.** (1-4 cr)
Patient case selection, assessment, documentation, treatment planning, implementation, and evaluation of dental hygiene treatment; case presentations.
- DH 4299. Selected Topics in Patient Education.** (1-4 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.** (1-4 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; SP-Fr; A-F only)

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)

Methods/applications of clothing assembly, from micro to macro perspective.

DHA 1311. Foundations I: Drawing and Design in Two and Three Dimensions. (4 cr; QP-DHA major or pre-major; SP-DHA major or pre-major; A-F only)

Introduction to 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 II: Color and Design in Two and Three Dimensions. (4 cr; QP-1323; SP-DHA major or pre-major; A-F only)

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 III: The Graphic Studio. (4 cr; QP-[DHA major or pre-major], 1325; SP-[DHA major or pre-major], [1311 or 1312]; or #; A-F only)

Overview of graphic design process. Creative procedure, terminology, technology. Computer applications. Digital illustration, page layouts, image scanning/manipulation.

DHA 1601. Interior Design Studio I. (4 cr; QP-DHA pre-major; SP-DHA pre-major; A-F only)

Introduction to theories used to solve interior design problems related to human behavior; the design process and communication skills required of the interior design profession.

DHA 1602. Interior Design Studio II. (4 cr; QP-#; SP-[DHA pre-major], 1601 with grade of at least C; A-F only)

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 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; QP-3216; SP-1201, 2213; A-F only)

Physical characteristics of garment components related to function of total garment. Laboratory problems based on methods of analysis including

visual inspection of garment quality, construction techniques, costing, labor, target consumer, and fit related to function, quality, and sizing.

DHA 2221. Clothing Design Studio I. (4 cr; QP-[1221 or pass sewing proficiency exam], 1323, 1328, DHA [major or pre-major]; SP-[1201 or pass sewing proficiency exam], 1221, 1311, 1312, DHA [major or pre-major]; A-F only)

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; QP-1231, 3211, DHA major; SP-2221, DHA major, pass portfolio review; A-F only)

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; QP-1323, 1325, 1328, DHA [major or pre-major]; SP-1311, 1312, [DHA major or pre-major]; A-F only)

Advanced drawing skills. Introduces illustration concepts/techniques. Illustration assignments for concepts, stories, ideas integrate design elements/principles.

DHA 2334. Computer Applications I: Digital Composition for Design. (3 cr; QP-[DHA major or pre-major], 1301, 1334; SP-[DHA major or pre-major], 1311, 1312, 1315; A-F only)

Composition of visual elements in electronic realm. Use of computer to design for traditional media, digital environments.

DHA 2345. Typographic Design. (3 cr; QP-DHA major, pass portfolio review; SP-DHA major, pass portfolio review; A-F only)

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; QP-3350, DHA major, pass portfolio review; SP-2345, DHA major, pass portfolio review; A-F only)

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; QP-Major, pass portfolio review; SP-Major, pass portfolio review; A-F only)

Introduction to human-factor variables of design. Color perception, type legibility, and other aspects of the human interface with designed objects are investigated. Students develop design prototypes and learn methods to evaluate the effectiveness of designed projects.

DHA 2401. Introduction to Housing. (3 cr; QP-1101; SP-1101 or #; A-F only)

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; QP-1101; SP-1101 or #; A-F only)

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. (3 cr; QP-1101; SP-1101 or #; A-F only)

Examine the meaning and significance of neighborhood and community, the process of residential neighborhood change, and the impact of housing on neighborhood conditions. Topics include gentrification, displacement, racial segregation, suburbanization, and community-based revitalization.

DHA 2603. Interior Design Studio III. (4 cr; QP-Pass portfolio review, DHA major; #; SP-1602 with grade of at least C, pass portfolio review, DHA major; A-F only) 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; QP-#; SP-DHA major, 2603 with grade of at least C; A-F only)

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; QP-Pass portfolio review, DHA major; SP-Pass portfolio review, DHA major; A-F only)

Environmental issues, from global to interior spaces. Effect of building codes. Environmental issues, legislation. Social awareness on designing for life safety, health, resource conservation. Functional/aesthetic relation of materials/resources to interior design.

DHA 2613. Lighting Design and Building Systems.

(4 cr; QP-[DHA major, pass portfolio review] or #; SP-[DHA major, pass portfolio review] or #; A-F only) 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; QP-[DHA major, pass portfolio review] or #; SP-[DHA major, pass portfolio review] or #; A-F only) 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; QP-3215, 3216; SP-2213, 2214; A-F only)

Relation of fashion trends to visual analysis of apparel. Application to design/retail.

DHA 3223. Clothing Design Studio III. (4 cr; QP-DHA major, 3211, 5218, pass portfolio review; SP-DHA major, 2222, pass portfolio review; A-F only)

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; QP-3211, 3232, 5218, DHA major; SP-3223, DHA major; A-F only)

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 3245. Nonstore Retailing. (3 cr; QP-1211; SP-1201; A-F only)

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; QP-DHA major, pass portfolio review; SP-DHA major, pass portfolio review; A-F only)

Use of color/form representation in two-dimensional surface applications. Emphasizes historical use of color, spatial representation in visual communication.

DHA 3352. Graphic Design II: Identity and Symbols.

(3 cr; QP-3351, pass portfolio review, DHA major; SP-2345, 2351, #3353, pass portfolio review, DHA major; A-F only) Representation of abstract ideas through symbols. Development of visual identity systems.

DHA 3353. Graphic Design III: Packaging and Display.

(3 cr; QP-3352, pass portfolio review, DHA major; SP-2345, 2351, 3352, #3352, pass portfolio review, DHA major; A-F only)

Application of graphic design principles to three-dimensional projects. Principles of three-dimensional design/space applied to labeling/packaging.

Course Descriptions

DHA 3605. Interior Design Studio V. (4 cr; QP-#; SP-2604 with grade of at least C, DHA major; A-F only) Advanced interior design projects dealing with small to medium scale spaces. Emphasizes special-needs populations.

DHA 3606. Interior Design Studio VI. (4 cr; QP-#; SP-3605 with grade of at least C, DHA major; A-F only) Advanced interior design projects dealing with large scale spaces. Emphasizes environmental concerns.

DHA 3614. Interior Design Ethics and Professional Practice. (4 cr; QP-Pass portfolio review; SP-2604, pass portfolio review; A-F only) 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; SP-Design minor; A-F only) Students share ideas/conclusions with one another, create a summary statement (e.g., document, multimedia display, designed object) of a significant learning insight.

DHA 4121. History of Costume. (4 cr; QP-General art history course; SP-General art history course; A-F only) Survey of clothing and appearance in Western cultures from pre-history to present. Role of gender, race, and class with respect to changes in dress within historical moments and social contexts. Research approaches and methods in the study and interpretation of dress.

DHA 4131. History of Visual Communication. (4 cr; QP-Intro history or art history course; SP-Intro history or art history course; A-F only) 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; QP-Arch history course or #; SP-Arch history course or #; A-F only) 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; QP-#; SP-4161 or #; A-F only) Study of European and American interiors and furnishings including furniture, textiles, and decorative objects.

DHA 4196. Internship in DHA. (1-4 cr; QP-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, #; SP-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, #; S-N only) 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. (4 cr; QP-[1101, jr] or grad student; SP-[1101, jr] or grad student; A-F only) 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; QP-[3215, 3216] or grad; SP-[2213, 2214] or grad; A-F only) Product development for apparel, other sewn products. Economics of quality, design for product effectiveness/reliability, quality specifications, conducting tests, interpreting results, inspection, acceptance sampling, vendor relations.

DHA 4217. International Developments in Textiles and Apparel. (4 cr; SP-1201 or grad; A-F only) Production, labor, trade, and marketing in textile, apparel, and related goods in global setting.

DHA 4225. Clothing Design Studio V. (4 cr; QP-5231, DHA major; SP-3224, DHA major; A-F only) 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; QP-5231, DHA major; SP-4225, DHA major; A-F only) 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; QP-1211, [Mktg 3000 or equiv]; SP-1201, [Mktg 3001 or equiv]; A-F only) 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; QP-1211; SP-1201; A-F only) Principles and mathematics of merchandise inventory control and the merchandise selection process.

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 dyeing, shibori, cyanotypes, and dye transfers are included.

DHA 4334. Computer Applications II: Design for the Digital Environment. (3 cr; QP-3334 or #, DHA major, pass portfolio review; SP-2334 or #, DHA major, pass portfolio review; A-F only) Build on skills developed in DHA 2334 while focusing on design of visual communication for electronic environments. Develop skills in the use of software to manipulate and create digital images and animation. Sound and video input will be 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; QP-DHA major, pass portfolio review; SP-2345, 2351, 13352, DHA major, pass portfolio review; A-F only) Further exploration of expressive visual communication of words. Fundamental legibility of 'the invisible art,' overt expression through type. Students complete an extended typographic project.

DHA 4351. Design Process: Photography. (3 cr; QP-DHA major, pass portfolio review; SP-DHA major, pass portfolio review; A-F only) Relationship between photography, design projects. Composition, developing of film, printing.

DHA 4352. Design Process: Bookmaking. (3 cr; QP-DHA major, pass portfolio review; SP-DHA major, pass portfolio review; A-F only) Construction of traditional/non-traditional book forms. Emphasizes material aspects of handmade books.

DHA 4354. Graphic Design IV: Integrative Campaign. (4 cr; QP-3352, DHA major, pass portfolio review; SP-3353, DHA major, pass portfolio review; A-F only) Focus on a multi-faceted graphic communication campaign involving substantial investigation and concept development. The project will support a unified concept for an identified client that is aimed effectively at a specific market or interest group.

DHA 4355. Graphic Design Portfolio. (2 cr; QP-3353, DHA major, pass portfolio review; SP-14354, 14365, DHA major, pass portfolio review; S-N only) Preparation of professional portfolio. Discussion of professional issues.

DHA 4365W. Graphic Design Senior Seminar. (4 cr; QP-3353, DHA major, pass portfolio review; SP-4354, DHA major, pass portfolio review; A-F only) This capstone class gives students the opportunity to complete a senior research and design project that demonstrates understanding and ability in the social, conceptual, and technical aspects of design.

DHA 4384. Interactive Media. (3 cr; QP-5334 or #, DHA major, pass portfolio review; SP-4334 or #, DHA major, pass portfolio review; A-F only) Design of interactive multimedia projects. Experience developing interactive presentations and electronic publishing. Software includes hypermedia, scripting, video and sound editing, animation, digital output.

DHA 4461. Multifamily Housing Management. (4 cr; QP-3463; SP-[2401, 2402, 2463] or #; A-F only) 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; QP-3463; SP-[2401, 2463] or #; A-F only) 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; QP-1401 or #; SP-2402 or #; A-F only) 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; QP-#; SP-3606 with grade of at least C, 3614, DHA major; A-F only) Sense of place. Contribution of artifacts to interior environments. Historic precedent, adaptive use, renovation, universal design projects.

DHA 4608W. Interior Design Thesis. (6 cr; QP-#; SP-4607 with grade of at least C, DHA major; A-F only) 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; QP-General art history survey course or #; SP-General art history survey course or #; A-F only) 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]; QP-Depends on topic, check with dept; SP-Depends on topic, check with dept; A-F only) In-depth investigation of a single specific topic, announced in advance.

DHA 5193. Directed Study in Design, Housing, and Apparel. (1-4 cr; QP-#; SP-#; A-F only) Independent study in design, housing, and apparel under tutorial guidance.

DHA 5196. Field Study: National/International. (1-10 cr [max 10 cr]; QP-#; SP-#; A-F only) Faculty-directed field study in a national or international setting.

DHA 5216. Textile and Apparel Consumer. (3 cr; QP-3216 or #; SP-1201, 2213 or #; A-F only) Consumer actions concerning textile/clothing products for home (and other physical interiors) and personal use as a part of daily living in different social, economic, and cultural settings, nationally and internationally.

DHA 5381. Digital Illustration. (3 cr; QP-5334, DHA major; SP-4334, DHA major; A-F only) Integration of design knowledge with computer applications. Use of raster-/vector-based programs for illustration.

DHA 5382. Digital Sound and Video. (3 cr; QP-[5334, DHA major] or #; SP-[4334, DHA major] or #; A-F only) Design solutions involving time-based media. Emphasizes sound/video. Electronic publishing via the internet.

DHA 5383. Modeling and Animation. (3 cr; QP-[5334, DHA major] or #; SP-[4334, DHA major] or #; A-F only) Three dimensional modeling/animation in electronic design communication.

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; SP-\$ArH 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; SP-\$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; SP-\$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; SP-\$Hist 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; SP-\$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; SP-\$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; SP-\$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; SP-\$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; SP-\$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; SP-\$Hist 3472)

Tradition/change in society/culture under Tokugawa shoguns (1600-1867). Growth of cities. Decline of samurai class. Response to Western intrusion.

DHA 5385. Internet-Based Media. (3 cr; QP-[5334, DHA major] or #: SP-[4334, DHA major] or #: A-F only)

Designing interactive presentations (using various operating systems) for internet/World Wide Web. Electronic publishing. Development of internet-based communication.

DHA 5388. Design Planning, Analysis, and Evaluation. (3 cr; QP-[3353, DHA major] or grad or #: SP-[4354, DHA major] or grad or #: A-F only)

Preliminary research, including theoretical, applied, and legal aspects. Planning/developmental models. Design prototyping, testing, and analysis.

DHA 5399W. Theory of Electronic Design. (3 cr; QP-[DHA major, sr] or grad or #: SP-[DHA major, sr] or grad student or #: offered alternate yrs; A-F only) Theories, methodologies, histories of electronic design, its impact on visual communications. Digital artifacts, processes, paradigms.

DHA 5463. Housing Policy. (3 cr; QP-3463; SP-2401, 2463 or #: A-F only)

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; QP-1400 or #: SP-2401 or #: A-F only)

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; QP-1400 or #: SP-2401 or #: A-F only) 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; QP-3463; SP-2401, 2463 or #: A-F only)

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. (4 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. (4 cr; SP-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. (4 cr; SP-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. (4 cr; SP-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; SP-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; SP-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]; SP-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]; SP-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]; SP-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]; SP-#, Δ, □)

Guided reading in or study of Dutch literature, culture, or advanced language skills.

Dtch 4001. Beginning Dutch. (2 cr; SP-\$1001, 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; SP-\$1002, 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; SP-\$1003, 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; SP-\$1004, 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]; SP-#, Δ, □)

Guided individual reading or study.

EAS 3473. Family, School, and Work in Modern Japanese History. (3 cr; SP-§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; SP-§Hist 3474; S-N only)
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; SP-§Soc 3661; Soc 1001 or courses on East Asia or experience in East Asia or #: A-F only)
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; SP-§Geog 3671, §Soc 3671; Geog 1301 or Soc 1001 or equiv in other social sciences or humanities or #: A-F only)
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]; SP-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; SP-§Pol 4467; 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; SP-§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; SP-§Soc 4662; 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]; SP-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; SP-§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; SP-Jr or sr, not for biology majors; A-F only)
Basic concepts in ecology; organization, development, and function of ecosystem; population growth and regulation. Human impact on ecosystems.

EEB 3361. Visions of Nature: The Natural World and Political Thought. (4 cr; QP-§Soph or jr or sr; biological sciences students may not apply these credits toward the major; SP-§CSCL 3361; 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 4002. Ecology of Minnesota. (2 cr; QP-College-level biology course; SP-College-level biology course; A-F only)

Consideration of how ecological systems are structured, work, and respond to what is done to and around them. Provides basis for understanding Minnesota's ecosystems, and assists students in evaluating alternatives and making wise decisions regarding Minnesota's ecology.

EEB 4014W. Ecology of Vegetation. (3 cr; QP-[Biol 3008 or Biol 5041 or Biol 5841], one qtr of statistics; SP-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 4016. Ecological Biogeography. (3 cr; QP-Biol 3008 or Biol 5041 or Biol 5841, PBio 3201; SP-Biol 3407)
Biotic regions of the world in general and North America in detail. Ecological principles of distribution, interpretations of regional and temporal patterns in distribution of vegetation, and taxonomic groups of plants and animals. Includes one weekend field trip.

EEB 4129. Mammalogy. (4 cr; QP-Biol 1106 or Biol 1806; SP-§FW 4129; Biol 1001 or Biol 2012; A-F only)
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; QP-§4834; Biol 1106 or Biol 1806; SP-§4834; Biol 1001 or Biol 2012)
Lab and field course in structure, classification, distribution, evolution, migration, habits, habitats, and identification of birds. Two weekend field trips.

EEB 4136. Ichthyology. (3 cr; QP-Biol 1106; SP-§FW 4136; 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 4156. Ecological Animal Physiology. (2 cr; QP-Biol 3011; SP-Biol 3211, Biol 2005 or #)
Functional adaptation of animals to their environment based upon biochemical and biophysical principles.

EEB 4601. Limnology. (3 cr; QP-Chem 1052; SP-§Geo 4601; Chem 1022; A-F only)
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; QP-§Geo 5621; 5601 or Geo 5601; SP-§Geo 4605; 4601 or #: A-F only)
Field and lab methods used to obtain information on environmental conditions in aquatic environments and measure the abundance of aquatic organisms, especially plankton; field and lab instruments, sampling devices, microscopy, water chemistry and data analysis.

EEB 4607. Plankton Ecology. (4 cr; SP-4601 or Geo 4601; A-F only)
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; QP-5601 or Biol 3008; SP-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 4631. Global Ecology. (4 cr; QP-Geo 3202, Geo 3301; SP-§Geo 4631; [college level ecology course, 2 semesters of [chemistry, high-school physics]] or #: A-F only)
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]; SP-#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only)
Individual study on selected topics or problems. Emphasizes readings, use of scientific literature. Writing intensive.

EEB 4794W. Directed Research: Writing Intensive. (1-7 cr [max 15 cr]; SP-#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only)
Laboratory or field investigation of selected areas of research. Writing intensive.

EEB 4814. Plant Community Ecology. (4 cr; QP-Ecology course; SP-Ecology course; A-F only)
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; QP-Ecology course; SP-Ecology course; Δ; A-F only)
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 4834. Field Ornithology. (4 cr; QP-§EEB 4134; general biology including study of zoology; SP-§EEB 4134; general biology including study of zoology; A-F only)
Lab and field course in structure, classification, distribution, evolution, migration, habits, and identification of birds. Emphasis on the breeding season, biology, and behavioral ecology of birds in the Itasca Park region. Techniques for conducting field studies. Includes lab.

EEB 4839. Field Studies in Mammalogy. (4 cr; QP-College-level biology course that includes study of animals; SP-College-level biology course that includes study of animals or #: Δ; A-F only)
Field course emphasizing techniques in study of small mammals; lectures and field projects emphasize identification, distributions, community interactions, ecophysiology, and population ecology.

EEB 4842. Arctic Field Ecology. (4 cr; SP—Basic courses in [ecology, organismal biology], approved application; A-F only)

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 4993. Directed Studies. (1-7 cr [max 7 cr]; SP—#, Δ; max of 7 cr of 4993 or 4994 may count toward major requirements; S-N only)

Individual study on selected topics or problems with emphasis on selected readings and use of scientific literature.

EEB 4994. Directed Research. (1-7 cr [max 7 cr]; SP—#, Δ; max of 7 cr of 4993 or 4994 may count toward major requirements; S-N only)

Laboratory or field investigation of selected areas of research.

EEB 5008. Forest Response to Quaternary Climate Change. (2 cr; QP—Biol 5041 or 5841; SP—Biol 3407, EEB 4631 or Geo 4631; ¶|EEB 5009; A-F only)

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; QP—5004 or Geo 5631 or #; SP—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; QP—PBio 3201 or #; SP—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; QP—PBio 3201 or #; SP—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; QP—Biol 5003 or GCB 3022, course in biometry or statistics; SP—Biol 4003 or GCB 3022, intro statistics or #; A-F only)

Genetic basis of variation in populations and of evolutionary change: allelic frequency dynamics with emphasis on natural selection, additive genetic variance and heritability. Current topics related to the consequences of artificial selection and inbreeding.

EEB 5051. Analysis of Populations. (3 cr; QP—Intro biology, intro statistics or #; SP—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; QP—Biol 3008; SP—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; QP—Biol 3008, Biol 1106 or 1806 or 3011, Biol 1103 or Biol 3012 or 3812, 10 cr biol sci; SP—Biol 2012 or 3002, 3407 or 3409; A-F only)

Ecological and environmental implications of mutualistic and antagonistic interactions between plants, animals and microbes at organismal, population, and community levels.

EEB 5321. Evolution of Social Behavior. (3 cr; QP—3111; SP—Biol 3411 or #; A-F only)

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; QP—3111 or Biol 3011; SP—Biol 3411 or Biol 3101 or NSc 3101 or Phsl 3101 or #; A-F only)

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; QP—3111; SP—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; QP—Advanced studies in history, philosophy, or biology; SP—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; QP—#; SP—#)

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; QP—Conservation biology grad; SP—Conservation biology grad or #; A-F only)

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; QP—\$1002, \$1005, \$1104; knowledge of plane geometry and intermediate algebra at the level of GC 0623 and GC 0631; SP—\$1104, \$1111; knowledge of plane geometry and 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 and effects of global linkages on individual decisions.

Econ 1101H. Honors Course: Principles of Microeconomics. (4 cr; QP—\$1002, \$1005, \$1104; knowledge of [plane geometry, intermediate algebra] at level of [GC 0623, GC 0631]; SP—\$1101, \$1104; 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; QP—\$1001, \$1004, \$1105; 1101 or equiv, knowledge of plane geometry and intermediate algebra at the level of GC 0623 and GC 0631; B avg recommended; SP—\$1105, \$1112; 1101 or equiv; knowledge of plane geometry and 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; QP—\$1001, \$1004, \$1105; 1101 or equiv, knowledge of plane geometry and intermediate algebra at level of GC 0623 and GC 0631; B avg recommended; SP—\$1102, \$1105; 1111 or equiv, Math 1271)

Aggregate consumption, saving, investment, and national income. Money, banking, and business cycles in the domestic and global economy. International trade, growth, and development. Role of the United States in the world economy, international interdependencies. Emphasis on economic models to explain macroeconomic phenomena.

Econ 1104. Principles of Microeconomics. (4 cr; QP—\$1002, \$1005, \$1101; 1 qtr calculus; SP—\$1101, \$1111; Math 1271)

Microeconomic behavior of consumers, firms, and markets in the domestic and 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; QP—\$1001, \$1004, \$1102; 1104 or equiv, 1 qtr calculus; SP—\$1102, \$1112; 1104 or equiv, Math 1271)

Aggregate consumption, saving, investment, national income. Role of money, banking, and business cycles in the domestic and world economy. International trade, growth, and development. U.S. and the world economy. International interdependencies among nations. Emphasis on calculus and mathematical reasoning.

Econ 1905. Freshman Seminar. (3 cr; SP—Fr or no more than 36 cr; A-F only)

Topics specified in *Class Schedule*.

Econ 3021. Survey of Economic Ideas. (3 cr; QP—1101, 1102 or equiv or #; SP—\$4022; 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; QP—1101, [1102 or equiv]; not open to Econ majors; SP—\$4031; 1101, [1102 or equiv]; not open to Econ majors)

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]; QP—1101, 1102 or equiv; SP—\$4033; 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; QP—1101, [1102 or equiv]; not open to Econ majors; SP—\$4041; 1101, [1102 or equiv]; not open to Econ majors)

What economic future holds. What can be done about global issues. How to improve economic prospects of countries.

Econ 3101. Intermediate Microeconomics. (4 cr; QP—\$3105; 1101, 1102 or equiv, 1 qtr calculus; SP—\$3105, \$3111; 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.

Course Descriptions

Econ 3101H. Honors Course: Intermediate Microeconomics. (4 cr; QP-1101, 1102 or equiv, 1 qtr calculus; B avg recommended; SP-\$3101, \$3105; 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; QP-3101 or equiv; SP-\$3112; 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; QP-\$3102; prereq 3101 or equiv; B avg recommended; SP-\$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; QP-\$3101, \$BGS 3001; prereq 1101, 1102 or equiv, 1 qtr calculus; not open to Econ majors; SP-\$3101, \$3111, \$BGS 3001; 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 and output decisions under different market structures. Investment behavior. Government regulation.

Econ 3501. Labor Economics. (3 cr; QP-\$5531; 1101, 1102 or equiv; not open to Econ majors; SP-\$4531; 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; QP-\$5631; 1101, 1102 or equiv; not open to Econ majors; SP-\$4631, \$4639; 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; QP-1101, 1102 or equiv; not open to Econ majors; SP-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; QP-\$5721, \$5721H; 1101, 1102 or equiv; not open to Econ majors; SP-\$4721, \$4729; 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; QP-\$5821; 1101, 1102 or equiv; not open to Econ majors; SP-\$5821; 1101, 1102 or equiv; not open to Econ majors)
Competing views on the proper role of government in the economy. Effects of tax and spending policies; private agents' response to government actions; optimal policies. Applications primarily to U.S. federal government.

Econ 3951. Major Project Seminar. (2 cr; QP-3101, 3102, 3103 or equiv; SP-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]; QP-1101, 1102 or equiv [others may be stated in *Class Schedule*]; SP-1101, 1102 or equiv [others may be stated in *Class Schedule*])
Topics specified in *Class Schedule*.

Econ 3991. Independent Study. (1-3 cr; QP-[1101, 1102] or #; SP-[1101, 1102] or #; S-N only)
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; QP-1101, 1102 or equiv, #; SP-1101, 1102 or equiv, #)
Guided individual reading or study in areas not available in regular course offerings.

Econ 4021W. Economics, Ethics, and Economic Philosophy. (3-4 cr [max 8 cr]; QP-1101, 1102 or equiv or #; SP-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; QP-\$3021, 3101, 3102; SP-\$3021; 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; QP-\$3031; 3101 or 3105 or #; SP-\$3031; 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]; QP-\$3033; 3101 or 3105 or #; SP-\$3033; 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; QP-\$3041; 3101 or 3105 or #; SP-\$3041; 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 4109H. Honors Course: Game Theory and Applications. (4 cr; QP-3101, 3102, 3103 or equiv, Math 1251-1252-1261; SP-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; QP-3101, 3102, 3103 or equiv, Math 1251-1252-1261 or equiv; SP-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; QP-3103, Math 3251-3252 or equiv, #; Econ 5113 recommended; SP-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; QP-5161; SP-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; QP-5162; SP-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; SP-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; QP-3102, 3103, Math 3251-3252 or equiv, #; 5113 recommended; SP-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; QP-5164; SP-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; QP-5165; SP-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; SP-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; QP-3101, 3102, 3103 or equiv; SP-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; QP-\$3231, \$5231; [[1101, 1102] or equiv], one qtr calculus, [Stat 3011, Stat 3012 [or equiv]], familiarity with computers; SP-[[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; QP-3101 [or equiv], Math 1251, Math 1252, Math 1261 [or equiv], [[Stat 5121, Stat 5122] or [Stat 5131, Stat 5132, Stat 5133]]; SP-[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; A-F only)
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; QP-5261; SP-4261; A-F only)
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 4301W. Economic Development. (3 cr; QP-\$5331; 1101, 1102 or equiv; not open to Econ majors; SP-\$4331; 1101, 1102 or equiv; not open to Econ majors)
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 4307. Comparative Economic Systems. (3 cr; QP-\$5337; 1101, 1102 or equiv; not open to Econ majors; SP-\$4337; 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; QP-\$5341; [1101, 1102] or equiv; SP-[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; QP-3101, 3102 or equiv; SP-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; QP-\$3315; 3101 or equiv; SP-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; QP-\$5301; 3101, 3102 or equiv; SP-\$4301; 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; QP-\$5307; 3101, 3102 or equiv; SP-\$4307; 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 4401W. International Economics. (3 cr; QP-\$5429, \$5431, \$5432; 1101, 1102 or equiv; not open to Econ majors; SP-\$4439, \$4431, \$4432; 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; QP-3101, 3102, 3103 or equiv or #; SP-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; QP-\$5401, \$5429; 3101, 3102, 3103 or equiv, 1 qtr calculus; B avg recommended; SP-\$4431, \$4401; 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; QP-\$4401, \$4439; 3101, 3102, 3103 or equiv; SP-\$4401, \$4439; 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; QP-\$5401; 3101, 3102, 3103 or equiv; 5431 or equiv recommended; SP-\$4401; 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; QP-\$3501; 3101, 3102 or equiv; SP-\$3501; 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 4611V. Honors Course: Environmental Valuation. (4 cr; QP-3101, [3103 or equiv], one qtr of calculus; SP-\$4831, \$4831W; [3101 or equiv], [Math 1271 or equiv]) Principles of cost-benefit analysis used for valuing the environment, costs of pollution. Defining, measuring, valuing benefits/costs. Economic growth, sustainable growth. Economic, ecological, ethical issues in using renewable/non-renewable resources. Optimal rate of use. Optimal pollution control.

Econ 4621V. Honors Course: Urban Economics. (4 cr; QP-3101 or equiv; B avg recommended; SP-3101 or equiv) Economics of urbanization. Location of economic activity and cities. Central place theory. Site rents and form of the city. Urban economic base and economic policy. Urban problems and economic policies: transportation, poverty and segregation, housing, public finance.

Econ 4623. Housing Markets and Public Policy. (3 cr; QP-1101, 1102 or equiv; SP-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; QP-\$3601; 3101, 3103; SP-\$3601, \$4639; 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 4631V. Honors Course: Industrial Organization and Antitrust Policy. (4 cr; QP-3101, 3103 or equiv, 1 qtr calculus; B avg recommended; SP-\$4631, \$3601; 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 and effects of antitrust and related legislation.

Econ 4721. Money and Banking. (3 cr; QP-\$3701, \$5701; 3101, 3102 or equiv; SP-\$3701, \$4729; 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 4721V. Honors Course: Money and Banking. (4 cr; QP-3101, 3102 or equiv, 1 qtr calculus; B avg recommended; SP-\$3701, \$4721; 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 the Federal Reserve system. Monetary policy.

Econ 4731. Macroeconomic Policy. (3 cr; QP-3101, 3102 or equiv; SP-\$4739; 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 4731V. Honors Course: Macroeconomic Policy. (4 cr; QP-3101, 3102 or equiv, 1 qtr calculus; B avg recommended; SP-\$4731; 3101, 3102 or equiv; Math 1271) 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 versus discretion; budget deficits; unemployment and inflation.

Econ 4741. Quantitative Analysis of the Macroeconomy. (3 cr; QP-[3101, 3102, Stat 3011] or equiv; SP-\$4749; [[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 4741V. Honors: Quantitative Analysis of the Macroeconomy. (4 cr; QP-[3101, 3102, Stat 3011] or equiv), 1 qtr calculus; B avg recommended; SP-\$4741; [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 4751. Financial Economics. (3 cr; QP-3101 or 3105, 1 qtr statistics, 1 qtr calculus; SP-\$4759; 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; QP-\$3752; 3751; B avg recommended; SP-\$4751; 3101, [3102 or equiv], [Math 1271 or equiv], [Stat 3011 or equiv]) Efficiency of financial markets. Theoretical concepts, empirical evidence.

Econ 4831W. Cost-Benefit Analysis. (3 cr; QP-[3101, 3103] or equiv; SP-\$4619, \$4611V; 3101 or equiv) Principles for evaluation of benefits/costs of public projects/programs. Issues connected with defining/measuring benefits/costs. Rate of return, rate of discount. Market imperfections, risk, uncertainty. Case studies of applications of theory.

Econ 4960. Topics in Economics. (3 cr [max 6 cr]; QP-3101, 3102, 3103 or equiv [others may be stated in *Class Schedule*]; SP-3101, 3102 or equiv; Math 1271 [may change based on topic]) Topics specified in *Class Schedule*.

Econ 4991. Independent Study. (1-4 cr; SP-#, Δ , \square) Before beginning, students confirm topic with faculty supervisor or director of undergraduate studies (otherwise no credit).

Econ 4993. Directed Study. (1-4 cr; QP-#, SP-#, Δ , \square) Guided individual reading or study in areas not available in regular course offerings.

Econ 5151. Elements of Economic Analysis: Firm and Household. (2 cr; QP-3101 or equiv, qtr calculus, qtr linear algebra, grad or #; SP-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; QP-3101, 3102 or equiv, qtr calculus, qtr linear algebra, grad or #; SP-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; QP-3101, 3102 or equiv or #; SP-3101, 3102 or equiv or #) Economics of research and development; technical change and productivity growth; impact of technology on institutions; science and technology policy.

Course Descriptions

Econ 5821. Public Economics. (3 cr; QP-§3801; 3101, 3103 or equiv; SP-§3801; 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.

Education and Human Development (EdHD)

College of Education and Human Development

EdHD 1901. Freshman Seminar, Environment. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1902. Freshman Seminar, Cultural Diversity. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1903. Freshman Seminar, Citizenship/Public Ethics. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1904. Freshman Seminar, International Perspectives. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1905. Freshman Seminar. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1906W. Freshman Seminar, Environment and Writing Intensive. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1907W. Freshman Seminar, Cultural Diversity and Writing Intensive. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1908W. Freshman Seminar, Citizenship/Public Ethics and Writing Intensive. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1909W. Freshman Seminar, International Perspectives and Writing Intensive. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 1910W. Freshman Seminar, Writing Intensive. (1-3 cr [max 6 cr]; SP-Fr)
Interdisciplinary seminar. Topics specified in *Class Schedule*.

EdHD 3001. Exploring the Teaching Profession. (1 cr [max 4 cr]; QP-Early admit for init lic/MEd program; SP-Early admit for init lic/MEd program, □ S-N only)
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; QP-MEd/init lic student or CLA music ed or preteaching major or #: psych course recommended; SP-MEd/init lic student or CLA music ed or preteaching major or #: psych course recommended; A-F only)
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; QP-MEd/init lic or CLA music ed or preteaching major or #: SP-MEd/init lic or CLA music ed or preteaching major or #: A-F only)
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; QP-§EdPA 5090; MEd/init lic student or CLA music ed major or preteaching major or #: SP-§EdPA 5090; MEd/init lic student or CLA music ed major or preteaching major or #: A-F only)
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; §CI 5300; [MEd/init lic or CLA music ed major or preteaching major or #], [basic knowledge of Macintosh operating system and of a word processing program]; SP-§5007 (qtr version), §CI 5300; [MEd/init lic or CLA music ed major or preteaching major or #], basic computer skills; A-F only)
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; SP-MEd/init lic or CLA music ed or preteaching or #: A-F only)
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)
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; SP-EdPA 1301/PA 1961, declared undergraduate leadership minor; A-F only)
Leadership and leadership capacities from multicultural/multidimensional perspectives. Students examine their own views on leadership. Leadership theory/practice, group dynamics/behavior, applying knowledge.

EdPA 4303W. Leadership in the World. (3 cr; SP-[3302 or PA 3961], completed field experience, undergrad leadership minor; A-F only)
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)
Organizational theory; issues in educational organizations; and how general theories apply to schools, colleges and universities, and a variety of other organizations.

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; SP-#)
Introduction to cultural variables of leadership that influence functioning of cross-cultural groups. Lectures, case studies, discussion, problem-solving, simulations. Intensive workshop. Enrollment limited.

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 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; SP-Postbaccalaureate)

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. Law and Educational Policy. (3 cr)

Reviews of the legal foundations of educational policy; statutory themes and case law; implications for educational organizations and administrative practice; case studies and emergent issues in recent court rulings.

EdPA 5346. Politics of Education. (3 cr; SP-Postbac, MED, or grad student; A-F only)

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 "futures 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; SP-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; SP-MEd student or #; A-F only)

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; SP-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 United States. (3 cr)

Review of contemporary policy issues affecting children and youth in the United States 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

Course Descriptions

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. (2-6 cr; SP-#; S-N only)

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]; QP-5240 or 5285 or EPsy 5243; SP-5501 or EPsy 5243; S-N only)

Informal seminar of faculty and advanced students interested in the issues and problems of program evaluation.

EDPA 5701. American Higher Education. (3 cr)

American higher and postsecondary education in historical and contemporary perspective; special emphasis on societal and political demands on higher education system; consequent changes in various forms and functions.

EDPA 5704. Student and Faculty Issues in Higher Education. (3 cr; QP-5201)

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 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.

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]; QP-#; SP-#)

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 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; S-N only)

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).

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; QP-5260 or other intro statistics course; SP-5261 or other intro statistics course; A-F only)

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. Basic Principles of Educational Measurement. (3 cr; QP-5260 or equiv; SP-5261 or equiv)

Concepts, principles, and methods in educational and psychological measurement. Specifically, the course will cover reliability, validity, item analysis, scores, grades, scales, test construction, and test evaluation.

EPsy 5231. Introductory Statistics and Measurement in Education. (4 cr)

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 5246. Evaluation Colloquium: Psychological Foundations. (1 cr [max 8 cr]; QP-5240/EdPA 5285; SP-5243/EdPA 5501; S-N only)

Informal seminar of faculty and advanced students interested in the issues and problems of program evaluation.

EPsy 5261. Introductory Statistical Methods. (3 cr)

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; SP-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)

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 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 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; QP-Upper div student; SP-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; QP-#; SP-#)

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; QP-Advanced undergrad or grad student in the helping professions; SP-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; QP-Counseling or career development course; SP-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;

QP-Advanced undergrad or grad student in the helping professions; SP-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;

QP-Child development course, 5601 or equiv; SP-Child development course, 5601 or equiv; A-F only)
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; QP-5601, 5608 or 5609; SP-5613; A-F only)

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; QP-5612; SP-5612; A-F only)

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; QP-5601; SP-5613, 5614; A-F only)

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; QP-5116; SP-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 kinesthology. 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; QP-5116, 5622; SP-5612, 5622)

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; QP-5601 or #; SP-5601 or #; A-F only)

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; QP-#; SP-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.

Course Descriptions

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; SP—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; QP—5643, 5644 or #; SP—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; QP—5644 or #; SP—[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; QP—5116, 5656; SP—5616, 5656; A-F only)

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; QP—5671 or #; SP—5671 or #; A-F only)

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; QP—5671, CI 5414 or equiv, or #; SP—5671, CI 5414 or equiv, or #; A-F only)

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; QP—5673, 5675 or #; SP—5675 or #; A-F only)

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 ophthalmological and optometric evaluations and functional vision assessment.

EPsy 5676. Case Management for Children With Visual Disabilities. (3 cr; QP—5671, 5673, 5675; SP—5671, 5673, 5675; A-F only)

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; QP—5625; SP—5625; A-F only)

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]; SP—[[SpEd grad or SpEd licensure Program or Foundations of Educ Program], [[5613 or 5613], [5614 or 5614]] or equiv] or #; A-F only)

Observations, supervised support of teaching practice in schools or other agencies serving children with disabilities in integrated programs.

EPsy 5720. Special Topics: Special Education. (1-4 cr [max 12 cr]; SP—#)

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]; QP—#; SP—#)

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]; QP—#; SP—#)

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]; QP—#; SP—#; S-N only)

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]; QP—#; SP—#; completion of all course requirements for license in ECSE; S-N only) 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]; QP—Completion of licensure courses for social and emotional disorders; #; SP—Completion of licensure courses for social and emotional disorders; #; A-F only)

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—Secondary. (1-6 cr [max 6 cr]; QP—Completion of all licensure coursework; #; SP—Completion of all licensure coursework; #; A-F only)

Supervised student teaching, or special practicum project, in schools, or other agencies serving individuals at the secondary level who have mild to moderate as well as moderate to severe disabilities.

EPsy 5756. Student Teaching: Developmental Disabilities—Elementary. (1-6 cr [max 6 cr]; QP—Completion of all licensure coursework; #; SP—Completion of all licensure coursework; #; S-N only)

Supervised student teaching, or special practicum project, in schools or other agencies serving children at the elementary level who have mild to moderate as well as moderate to severe disabilities.

EPsy 5757. Student Teaching: Physical and Health Related Disabilities. (1-6 cr [max 8 cr]; QP—#; SP—#; A-F only)

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]; QP—#; SP—#; A-F only)

Supervised student teaching, or special practicum project, in schools or other agencies serving children and adolescents who have visual impairments.

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; QP—Honors senior class or grad student; SP—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]; QP-#: SP-#: A-F only) 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; QP-[BSEE or BEE], pass EIT exam, four yrs elec eng experience; SP-[BSEE or BEE], pass EIT exam, four yrs elec eng experience; A-F only) 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; SP-¶2301; S-N only) Discussion section to go with 2301.

EE 0361. Introduction to Microcontrollers: Discussion. (0 cr; SP-¶2361; S-N only) Discussion section to go with 2361.

EE 1001. Introduction to Electrical and Computer Engineering. (1 cr; QP-lower div IT or Δ; SP-lower div IT or Δ; S-N only) 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; QP-High school algebra; SP-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; QP-Phys 1253, Math 3261; SP-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; QP-3009, 3061; SP-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. (0.5 cr; QP-1400, 3010, 3061) In combination with 1400, completes the 2002 requirement.

EE 2011. Linear Systems and Circuits. (3 cr; QP-3009; 3061; SP-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; QP-3009; §3061; SP-Linear circuits; §2001) 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; QP-#: SP-2001 or 2101; §2011) 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; QP-IT [soph or jr or sr]; SP-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; QP-CSci 3113; SP-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, interrupts, using special-purpose features such as A/D converters, fuzzy logic, DSP operations. Integral lab.

EE 3005. Fundamentals of Electrical Engineering. (4 cr; QP-Math 3261, Phys 1253; not for EE majors; SP-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; QP-3005; SP-¶3005) Lab to accompany 3005.

EE 3015. Signals and Systems. (3 cr; QP-3010; SP-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 3025. Statistical Methods in Electrical and Computer Engineering. (3 cr; QP-3011; SP-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; QP-3062; SP-3115 or ¶3115) Experiments in circuits and electronics.

EE 3102. Circuits and Electronics Laboratory II. (2 cr; QP-3401, 3062; SP-3101) Experiments in circuits and electronics; team design project.

EE 3105. Circuits and Electronics Transition Laboratory. (0.75 cr; QP-3400; SP-3015; A-F only) Together with 3400, completes the 3101 requirement.

EE 3115. Analog and Digital Electronics. (4 cr; QP-3010; SP-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; QP-Upper div IT, 3010, Phys 1253, Phys 3501; SP-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 3601. Transmission Lines. (3 cr; QP-3009, [Math 3252 or Math 3261], Phys 1253; SP-2001, [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; QP-Admission to ECE co-op; SP-Admission to ECE co-op; S-N only) 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; QP-3011, 3062; SP-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; QP-[3011, 5002, [upper div EE or grad student in IT major]] or #; SP-[3015, 4541, [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; QP-[3011, 5002, upper div IT] or #; SP-[3015, 4541, 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; QP-5253 or #; SP-4231 or ¶4231; no EE or CompE grad cr) Lab to accompany 4231.

EE 4237. State Space Control Laboratory. (1 cr; QP-#: SP-4233 or ¶4233; no cr for [EE or CompE] grad students) Lab to accompany 4233.

EE 4301. Digital Design With Programmable Logic. (4 cr; QP-3351, CSci 3113; SP-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; QP-3351, 3352, upper div IT; SP-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; QP-3021; SP-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; QP-5202, 5203; SP-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; QP-3011, 3021; SP-3015, 3025) Review of linear discrete time systems and sampled and digital signals; Fourier analysis, discrete and fast Fourier transforms; interpolation and decimation; design of analog, infinite-impulse response and finite impulse response filters; quantization effects.

Course Descriptions

- EE 4601. Electromagnetics for RF Engineering and Optics.** (4 cr; QP-3110 or equiv; SP-3601 or equiv; no EE grad cr; no CompE grad cr; A-F only)
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; QP-3011; SP-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.** (3 cr; QP-3010; SP-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; QP-3011, 3062; SP-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; QP-3011, 3111, 3062; SP-3015, 3601, 3115)
Team participation in formulating and solving open-ended design problems. Oral and written presentations.
- EE 4961. Industrial Assignment II.** (2 cr; QP-3476, ECE co-op; no grad cr; SP-3961, ECE co-op; no grad cr; S-N only)
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; QP-5478; no grad cr; SP-4961, EE co-op, Δ; no grad cr; S-N only)
Industrial work assignment in ECE co-op program. Formal written report covering semester's work.
- EE 4970. Directed Study.** (1-3 cr; QP-Cr ar [may be repeated for cr]; Δ; SP-Cr ar [may be repeated for cr]; Δ)
Studies of approved projects, either theoretical or experimental.
- EE 4982V. Senior Honors Project II.** (2 cr; QP-Δ; SP-4981, ECE honors, Δ)
Design project.
- EE 5141. Integrated Sensors and Transducers.** (4 cr; QP-3063, 3111; SP-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; QP-3063, 3111 or #; SP-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; QP-5661 or #; SP-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; QP-IT sr or grad; SP-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; QP-5670; SP-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; QP-IT grad, Math 5242, Math 5243 or #; SP-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; QP-IT grad, Math 5243 or # [Math 5243 or #]; SP-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; QP-3351 or #; SP-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; QP-5874; SP-5301 or #)
Basic algorithms, computational complexity. High-level synthesis. Test generation. Power estimation. Timing optimization. Current topics.
- EE 5323. VLSI Design I.** (3 cr; QP-[3351, 3062] or #; SP-[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; QP-5571 or #; SP-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; QP-5358, 5572 or #; SP-4301, 5323 or # [5323 or #])
Lab to accompany 5323. Complete design of integrated circuits. Designs evaluated by computer simulation. Selected designs fabricated and tested in succeeding semester.
- EE 5329. VLSI Digital Signal Processing Systems.** (3 cr; QP-5572 or #; SP-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; QP-[3062, grad student] or #; SP-[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; QP-3351, 3352; SP-2301, 2361; SSci 5201)
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; QP-5852 or #; SP-5361 or #)
Tools and techniques for analyzing computer hardware, software, and system performance. Benchmark programs, measurement tools, performance metrics. Deterministic and probabilistic simulation techniques, random number generation and testing. Bottleneck analysis.
- EE 5381. Advanced Computer Networks.** (3 cr; QP-3021, 5853, CSci 5211 or #; SP-3025, 4361 or #)
High-performance communication network architectures, protocols and resource allocation techniques. Emphasizes performance and quantitative analysis. Current developments: integration of services, Asynchronous Transfer Mode (ATM) networks and switches, Integrated Service Digital Network (ISDN).
- EE 5391. Computing With Neural Networks.** (3 cr; QP-3021 or Stat 3091 or #; SP-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; QP-5203, 3021, sr or grad in IT major or #; SP-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 interference; optimal and suboptimal sequence detection; equalization. Error correction coding; trellis-coded modulation; multiple access.
- EE 5505. Wireless Communication.** (3 cr; QP-5203; SP-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; QP-3021, grad in IT major or #; SP-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; QP-[5511, 5702] or #; SP-[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; QP-3352, 5511, EE sr or grad in IT major or #; SP-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; QP-5511; SP-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; QP-5511, 5702, grad in IT major or #; SP-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; QP-5702 or #; SP-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; QP-IT sr or grad or #; SP-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; QP-3111, [IT sr or grad in IT major]; SP-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; QP-5604; SP-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; QP-Upper div IT or grad, ME 3301, ME 3303; SP-Upper div IT or grad, ME 3321, ME 3322 or equiv; \$ME 5361)

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; QP-5604; SP-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; QP-5604; SP-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; QP-3011 or #; SP-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; QP-5625; SP-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; QP-3111; SP-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; QP-3011, 3111 or #; SP-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 transmission systems. Direct detection and coherent detection. Optical amplifiers. Optical soliton propagation.

EE 5629. Optical System Design. (2 cr; QP-IT sr or grad; SP-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; QP-5630; SP-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; QP-IT grad or #; SP-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; QP-IT grad or #; SP-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; QP-IT sr or grad student or #; SP-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; QP-5300, 5322 or #; SP-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; QP-5802 or #; SP-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; QP-3010, 5300, 5310 or #; SP-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; QP-5814 or #; SP-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; QP-IT sr or life-science sr or grad student; SP-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; QP-IT sr or life science sr or grad; SP-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 5940. Special Topics in Electrical Engineering I.

(1-4 cr; QP-#: SP-#)
Special topics in electrical and computer engineering. Topics vary.

EE 5950. Special Topics in Electrical Engineering II.

(1-4 cr; QP-#: SP-#)
Special topics in electrical and computer engineering. Topics vary.

EE 5960. Special Topics in Electrical Engineering III.

(1-4 cr; QP-#: SP-#)
Special topics in electrical and computer engineering. Topics vary.

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; QP-EHS; SP-EHS; A-F only)

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 and Asian and Slavic Languages and Literatures

College of Liberal Arts

ESL 0010. TOEFL Preparation. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Individual attention to specific areas of spoken language including intonation, rhythm, and segmentals.

ESL 0040. Skills Enhancement. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Student will focus on specific areas of their English which need improvement.

ESL 0080. English Through Literature. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Introduces and reviews grammatical structures with attention to meaning, use, and form.

ESL 0121. Beginning Reading/Composition. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Focuses on the ability to communicate in English in everyday situations. Listening and speaking are emphasized.

ESL 0181. Beginning Integrated English. (0 cr; QP–Nonnative English Speaker; see Minnesota English Center for override; SP–Nonnative English Speaker, Δ; see Minnesota English Center for override; S-N only) Reading, writing, speaking, listening, grammar.

ESL 0191. Beginning Skills Enhancement. (0 cr; QP–Nonnative English Speaker; see Minnesota English Center for override; SP–Nonnative English Speaker, Δ; see Minnesota English Center for override; S-N only)

Improving basic English language skills through work in computer/language lab. Focused activities for individual learners.

ESL 0193. Pronunciation. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Addresses important aspects of English pronunciation necessary to improve comprehensibility and reduce foreign-accent. Includes work on enunciation; word, phrasal, and sentence stress; intonation; linking; thought groups; and rhythm.

ESL 0200. Understanding American Universities. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will learn basic word processing.

ESL 0310. Computer Lab: Using the Internet for Language Learning. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will complete projects on e-mail and the internet.

ESL 0311. Low Intermediate Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will learn the basics of using the university library system for research purposes.

ESL 0411. Intermediate Grammar. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will learn about and participate in community service projects.

ESL 0511. High Intermediate Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) How to write business letters in English. E-mail, voice mail for business.

ESL 0611. Advanced Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) 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; SP-0621; S-N only)
Continuation of ESL 0621.

ESL 0641. Advanced Listening Comprehension. (0 cr; QP-Nonnative English speaker. See Minnesota English Center for override; SP-Nonnative English speaker. See Minnesota English Center for override; S-N only)
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; QP-Nonnative English speaker. See Minnesota English Center for override; SP-Nonnative English speaker. See Minnesota English Center for override; S-N only)
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; QP-Nonnative English speaker. See Minnesota English Center for override; SP-Nonnative English speaker. See Minnesota English Center for override; S-N only)
Students will work on comprehending authentic texts of significant lengths. Develop strategies to apply in academic reading.

ESL 0671. Advanced Composition. (0 cr; QP-Nonnative English speaker. See Minnesota English Center for override; SP-Nonnative English speaker. See Minnesota English Center for override; S-N only)
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; QP-Nonnative speaker of English; see Minnesota English Center for override; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
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; QP-Nonnative speaker of English; see Minnesota English Center for override; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
Focuses on production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0712. Grammar Through Writing. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
Production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0713. Grammar Through Writing. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
Production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0721. High Advanced Reading/Composition. (0 cr; QP-Nonnative speaker of English; see Minnesota English Center for override; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
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; QP-Nonnative speaker of English; see Minnesota English Center for override; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
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; SP-0731; S-N only)
Continuation of 0731

ESL 0741. High Advanced Listening Comprehension. (0 cr; QP-Nonnative speaker of English; see Minnesota English Center for override; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
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; QP-Nonnative English speaker; see Minnesota English Center for override; SP-Nonnative English speaker; see Minnesota English Center for override; S-N only)
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; QP-Nonnative speaker of English; see Minnesota English Center for override; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
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; QP-Nonnative speaker of English; see Minnesota English Center for override; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
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; QP-Nonnative speaker of English; see Minnesota English Center for override; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English for formulating hypotheses, describing experiments, and presenting results; includes reading, writing, listening, and speaking activities based on scientific and technical English.

ESL 0810. Beginning English as a Second Language: W. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English grammar, reading, writing, speaking/ pronunciation, listening. Basic grammar structures. Vocabulary/reading with attention to main ideas, word forms, skimming, and scanning. Writings fundamentals, including spelling, punctuation, organization. Emphasizes ability to comprehend/communicate in everyday situations.

ESL 0820. High Beginning English as a Second Language: O. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English grammar, reading, writing, speaking/ pronunciation, listening at high-advanced level. Basic grammar structures. Reading passages of increased difficulty. Writing fundamentals, organization. Comprehension/communication of everyday English in structured/semi-structured situations.

ESL 0830. Low Intermediate English as a Second Language: R1. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English grammar, reading, writing, speaking/ pronunciation, listening at a low-intermediate level. Grammatical structures with attention to form, meaning, and use. Writing. Reading fluency, efficiency, vocabulary, comprehension. Critical reading. Fluency/accuracy in conversational/academic listening/speaking.

ESL 0840. High Intermediate English as a Second Language: R2. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English grammar, reading, writing, speaking/ pronunciation, and listening at high intermediate level. Difficult areas of grammar. Reading for academic purposes or for pleasure to increase fluency. Writing

skills. Comprehension of lecture information and of complex information in non-lecture formats. Spoken English in academic/social situations.

ESL 0850. Advanced English as a Second Language: D1. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English grammar, reading, writing, speaking/ pronunciation, and listening at advanced level. Active use of advanced structures in writing/speaking. Reading passages of cultural interest. Letter/journal/academic writing. Informal English for everyday purposes (idioms/reductions). Conversation, formal discussion, and presentation skills.

ESL 0860. High Advanced English as a Second Language: D2. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English grammar, reading, writing, speaking/ pronunciation, and listening at high advanced level. Developing strategies for expanding/activating vocabulary. Developing reading speed, finding main ideas, understanding supporting details. Letter/journal/academic writing through essays and research papers. Idioms, reduced forms.

ESL 0870. English as a Second Language for Admitted Students: A1. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English grammar, reading, writing, speaking/ pronunciation, and listening at advanced level. Active use of advanced structures in writing/speaking. Reading passages of cultural interest. Letter/journal/academic writing. Informal English for everyday purposes (idioms/reductions). Conversation, formal discussion, and presentation skills.

ESL 0880. English as a Second Language for Admitted Students: A2. (0 cr; SP-Nonnative speaker of English; see Minnesota English Center for override; S-N only)
English grammar, reading, writing, speaking/ pronunciation, and listening at high advanced level. Developing strategies for expanding/activating vocabulary. Developing reading speed, finding main ideas, understanding supporting details. Letter/journal/academic writing through essays, research papers. Practice with idioms, reduced forms.

ESL 0911. Fundamentals in English as a Second Language. (0 cr; QP-Δ, satisfactory score on [EPT or MNBatt or TOEFL]; SP-Δ, satisfactory score on [EPT or MNBatt or TOEFL]; S-N only)
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; QP-Δ, satisfactory score on [EPT or MNBatt or TOEFL]; SP-Δ, satisfactory score on [EPT or MNBatt or TOEFL]; S-N only)
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; QP-Δ, satisfactory score on [EPT or MNBatt or TOEFL]; SP-Δ, satisfactory score on [EPT or MNBatt or TOEFL]; S-N only)
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; QP-Δ, satisfactory score on [EPT or MNBatt or TOEFL]; SP-Δ, satisfactory score on [EPT or MNBatt or TOEFL]; S-N only)
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; SP-Satisfactory score on [EPT or MNBatt or TOEFL]; S-N only)
Communication skills for social, academic, and professional purposes. Emphasizes listening/speaking. Content drawn from mass media.

ESL 0937. International Business Communication. (0 cr; SP–Non-native speaker of English; see Minnesota English Center for override; S-N only)
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; QP–Δ, grad student, non-native speaker of English, satisfactory score on [EPT or MNBatt or TOEFL]; SP–Δ, grad student, non-native speaker of English, satisfactory score on [EPT or MNBatt or TOEFL]; S-N only)
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; SP–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; SP–1101 or 1102 or Δ)
Exercises, experiments, assigned readings, discussion of student work.

EngW 3103. Advanced Fiction Writing. (4 cr; SP–3102 or Δ)
Advanced workshop.

EngW 3104. Intermediate Poetry Writing. (3 cr; SP–1101 or 1103 or Δ)
Exercises, experiments, assigned readings, discussion of student work.

EngW 3105. Advanced Poetry Writing. (4 cr; SP–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; SP–1104 or Δ)
Exercises, experiments, assigned readings, and discussion of students' work.

EngW 3107. Advanced Nonfiction Writing. (4 cr; SP–3106 or Δ)
Advanced workshop.

EngW 3110. Topics in Creative Writing. (3 cr [max 9 cr]; SP–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]; SP–[1101 or 1102 or 1103 or 1104], honors)
Topics specified in *Class Schedule*.

EngW 3960. Writing Workshop for Majors. (3 cr; SP–Engl major, 6 cr of EngW, [jr or sr], major adviser approval, Δ)
Topics specified in *Class Schedule*.

EngW 5102. Advanced Fiction Writing. (4 cr [max 8 cr]; SP–Δ)
Advanced workshop for graduate students with considerable experience in writing fiction.

EngW 5103. Advanced Fiction Writing. (4 cr [max 8 cr]; SP–Δ)
Advanced workshop for students with considerable experience in writing fiction.

EngW 5104. Advanced Poetry Writing. (4 cr [max 8 cr]; SP–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]; SP–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]; SP–Δ)
Advanced workshop for graduate students with considerable experience in writing literary nonfiction.

EngW 5107. Advanced Nonfiction Writing. (4 cr [max 16 cr]; SP–Δ)
Advanced workshop for students with considerable experience in writing literary nonfiction.

EngW 5110. Topics in Advanced Fiction Writing. (4 cr [max 16 cr]; SP–Δ)
Special topics in fiction writing. Topics specified in *Class Schedule*.

EngW 5120. Topics in Advanced Poetry. (4 cr [max 16 cr]; SP–Δ)
Special topics in poetry writing. Topics specified in *Class Schedule*.

EngW 5130. Topics in Advanced Creative Writing. (4 cr [max 16 cr]; SP–English major or Δ)
Advanced workshop that 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 II: Memory in Different Modes. (3 cr; A-F only)
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]; SP–Δ)
Advanced workshop. Contact creative writing program for specific description.

EngW 5205. Screenwriting. (4 cr; SP–Δ)
Advanced workshop. Contact creative writing program for specific description.

EngW 5210. Topics in Advanced Literary Nonfiction. (4 cr [max 16 cr]; SP–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]; SP–Grad student or Δ)
Special topics in reading fiction, literary nonfiction, poetry. Topics specified in *Class Schedule*.

EngW 5401. Introduction to Editing. (4 cr)
Beginning editing, from nature of the editor-writer relationship to manuscript reading, author querying, rewriting, style. Some discussion of copy editing. Students develop editing skills by working on varied writing samples.

EngW 5402. Advanced Editing. (4 cr; SP–5401, #, Δ)
For students with advanced editing competence to further advance their skills. Workshop/seminar; editing long text and fiction, children's literature, translations and indexes.

EngW 5501. Minnesota Writing Project Selective Institute. (3 cr [max 3 cr]; SP–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; SP–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; SP–\$Jour 5606; A-F only)
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]; SP–#, 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; SP–\$1001; honors; A-F only)
Basic techniques for analyzing/understanding literature. Readings of novels, short stories, poems, plays.

EngL 1001W. Introduction to Literature: Poetry, Drama, Narrative. (4 cr; SP–\$1002; [EngC 1011 or equiv], 12 cr)
Basic techniques for analyzing/understanding literature. Readings of novels, short stories, poems, plays.

EngL 1181V. Honors: Introduction to Shakespeare. (4 cr; SP–\$1181; honors; A-F only)
Survey of Shakespeare's work, treating approximately 10 plays. Lecture.

EngL 1181W. Introduction to Shakespeare. (4 cr; SP–\$1182)
Survey of Shakespeare's work, treating approximately 10 plays. Lecture.

EngL 1201V. Honors: Introduction to American Literature. (4 cr; SP–\$1201; honors; A-F only)
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; SP–\$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; SP–\$1301; honors; A-F only)
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; QP-Honors regis or Δ; SP-\$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; SP-\$1401; honors; A-F only)

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; QP-Honors regis or Δ; SP-\$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 1910W. Topics: Freshman Seminar. (3 cr; SP-Fr or max 36 cr; A-F only)

Topics specified in *Class Schedule*.

EngL 3001V. Honors: Textual Interpretation, Analysis, and Investigation. (4 cr; SP-\$3001; honors, EngL [major or minor]; A-F only)

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; QP-EngL [major or minor or premajor]; SP-\$3801; EngL [major or minor or premajor])

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; SP-\$3802; 12 cr in other literature courses)

Problems of interpretation/criticism. Questions of meaning, form, authority, literary history, social significance.

EngL 3002H. Honors: Modern Literary Criticism and Theory. (3 cr; SP-\$3002; 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; A-F only)

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; QP-EngL [major or pre-major] or #; SP-\$3807; EngL [major or minor or pre-major] or #)

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; QP-CLA honors; SP-\$3007; 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 3020. Studies in Narrative. (3 cr [max 9 cr];

QP-For honors - honors regis or Δ)

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; SP-\$3020; honors; A-F only)

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 3040. Studies in Film. (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; SP-\$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 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 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*.

Course Descriptions

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; SP-\$3350; 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 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 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; SP-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 3882V. Honors: Senior Paper. (2 cr; SP-\$3882;

English major, honors, Δ; A-F only)
Senior paper.

EngL 3882W. Senior Paper. (2 cr; SP-\$3884; EngL major,

Δ; A-F only)
Senior paper.

EngL 3883V. Honors Thesis. (3 cr; SP-Honors summa

cum laude candidacy in EngL, consent of EngL honors adviser; A-F only)
Honors thesis. See guidelines available from English honors adviser.

EngL 3960. Junior-Senior Seminar. (3 cr; SP-English

major, [jr or sr], completion of University writing requirement, Δ)
Intensive study of major literary topic, figure, period, or genre, or of an English language topic. Topics specified in *Class Schedule*.

EngL 3980. Directed Instruction. (1-6 cr; SP-#, Δ, □)

Directed study arranged between student and advising faculty member.

EngL 3992. Directed Reading. (1-15 cr [max 15 cr];

SP-#, Δ, □ A-F only)
Guided individual reading.

EngL 3993. Directed Study. (1-8 cr; SP-#, Δ, □)

Guided individual study.

EngL 3994. Directed Research. (1-15 cr [max 15 cr];

SP-#, Δ, □ A-F only)
Directed individual research. Qualified students work on a tutorial basis.

EngL 5001. Introduction to Methods in Literary

Studies. (3 cr; SP-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; SP-Grad or #)

Approaches to practical/theoretical problems of literary history/genre.

EngL 5120. Reading in American Literature. (3 cr [max 9 cr]; SP-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]; SP-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]; SP-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]; SP-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]; SP-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]; SP-Grad or #)

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]; SP-Grad or #)

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]; SP-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]; SP-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 5581. Folklore I. (3 cr; SP-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; SP-[5581, grad student] or #)

Training in collection of folklore materials.

EngL 5800. Practicum in the Teaching of English. (2 cr [max 9 cr]; SP-Grad student, #; S-N only)

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]; SP-Grad student or [#, Δ, □]; A-F only)
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; SP-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; SP-\$1811; placement in category 2 or 3; some sections may be 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; SP-\$1011; honors, [placement in category 2 or 3]; A-F only)

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, Emphasis on Cultural Diversity. (4 cr; SP-Placement in category 2 or 3; some sections may be limited to ESL students)

Extended practice in writing on topics concerning cultural diversity. Course projects involve critical reading and interpretation of selected texts, research in various types of resources, and writing that moves through several drafting steps. Finished writing is revised and edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1012H. Honors: University Writing and Critical Reading, Emphasis on Cultural Diversity. (4 cr; SP-Honors, [placement in category 2 or 3]; A-F only)

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, Emphasis on Environment. (4 cr; SP-Placement in category 2 or 3; some sections may be limited to ESL students)

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. Honors: University Writing and Critical Reading, Emphasis on Environment. (4 cr; SP-\$1013; honors, [placement in category 2 or 3]; A-F only)

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, Emphasis on Public Ethics. (4 cr; SP-Some sections may be limited to ESL students)

Writing on topics concerning citizenship and public ethics. Projects involve critical reading and

interpretation of selected texts, research in various types of resources, and writing through several drafting steps. Finished writing is revised and edited to meet university-level standards.

EngC 1014H. Honors: University Writing and Critical Reading, Emphasis on Public Ethics. (4 cr; SP-\$1014; honors; A-F only)

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, correctness.

EngC 1021. Intermediate Expository Writing. (4 cr; SP-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; SP-Completion of fr writing req.jr, at least 60 sem cr)

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 3601W. Analysis of the English Language and Culture. (4 cr)

Introduction to the structure of English, including phonetics, phonology, morphology, syntax, semantics, and pragmatics, and to language variation and usage.

EngC 3602W. Gender and the English Language. (4 cr)

Connections between gender and other social factors which influence the history and future of the English language, including race, ethnicity, class, regional and national variation, religion, and technology. Explorations of gender theories as they relate to social issues, texts, and discourse practices.

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 3604. Public Discourse. (3 cr [max 9 cr])

Focuses on popular culture and the media as important modes of cultural discourse—their histories and rhetorics, their systems of production and circulation, their work in constructing us and our work in construing them.

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 3607. Introduction to Academic Literacy. (4 cr)

Introduction to theories of literacy in academic disciplines. Understanding different rhetorical conventions across disciplines with an emphasis on improving academic writing using one-to-one tutoring sessions. Significant commitment to service learning as a peer tutor, this semester and next.

EngC 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).

EngC 3612. Old English I. (3 cr; SP-\$5612)

Introductory study of the language to 1150 A.D. Selected readings in prose and poetry. Some attention to the culture of the Anglo-Saxons.

EngC 3613. Old English II. (3 cr; QP-\$Engl 3613; SP-\$5613; EngC 3612)

Critical reading of texts; introduction to versification. Readings of considerable portions of "Beowulf."

EngC 3621W. Writing Beyond the Academy. (4 cr; SP-#, appropriate internship placement)

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 3632. Electronic Text. (3 cr; SP-\$5632)

Widespread electronic networking has renewed some perplexing questions about the status and function of text. Investigate many of these and related questions as reframed by the phenomenon of electronic text.

EngC 3633. History of Writing Technologies. (4 cr)

Topics include the equivocal relation of memory and writing; literacy, power, and control; secrecy and publicity; alphabetization and other ways of ordering the world; the material bases of writing; typographical design and expression; theories of technological determinism.

EngC 3641. Editing for Publication. (4 cr)

Practice professional editing of various kinds of texts, for example, the editing of scientific and technical writing. Introduction to editing levels from substantive revision to copyediting, and computer-mediated editorial practices.

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; SP-[Grad student or approval of EngC coordinator for non-native speakers of English], [TOEFL of at least 550 or completion of University's English Program for International Students])

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 5602. Gender and the English Language. (3 cr; SP-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.

EngC 5603. Varieties of World English. (3 cr; SP-Grad student or #)

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 5605. Social Variation in American English. (3 cr; SP-Grad student or #)

Description/analysis of English language variation from a 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.

EngC 5611. History of the English Language. (3 cr; SP-Grad student or #)

Development of the English language from Old English (mid-5th century) to Middle English (around 1100) to Early Modern English (about 1500).

EngC 5612. Old English I. (3 cr; SP-\$3612; grad student or #)

Introduction to the language to A.D. 1150. Selected readings in prose and poetry. Some attention to Anglo-Saxon culture.

EngC 5613. Old English II. (3 cr; SP-\$3613; [[3612 or 5612], grad student] or #)

Critical reading of texts, introduction to versification. Reading of Beowulf.

EngC 5621. Irish Language I. (4 cr; QP-[Grad or undergrad] English major or #; SP-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.

EngC 5622. Irish Language II. (4 cr; SP-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.

EngC 5630. Theories of Writing and Instruction. (3 cr; SP-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*.

EngC 5631. History of Rhetoric and Writing. (3 cr; SP-Grad student or #)

Surveys, compares, and contrasts assumptions of classical and contemporary rhetorical theory, especially as they influence the interdisciplinary field of composition studies.

EngC 5632. Electronic Text. (3 cr; SP-\$3632; grad student or #)

Status/function of text in electronic networking. Related questions as reframed by the phenomenon of electronic text.

EngC 5640. Research Methods in Rhetoric, Composition, and Language. (3 cr; SP-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*.

EngC 5650. Topics in Rhetoric, Composition, and Language. (3 cr; SP-Grad student or #)

Topics specified in *Class Schedule*.

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; QP-Biol 1009 or equiv; SP-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; QP-1005)

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; QP-3005 or #; A-F only)

Management of insect populations. Life histories. Habits/recognition of insect pests of field/vegetable crops. Lecture/lab.

Course Descriptions

Ent 4015. Ornamentals and Turf Entomology. (3 cr; QP-1xxx course in biol or hort or forest resources; SP-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; QP-Biol 1009 or #; SP-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; QP-¶4021 recommended, Biol 1009 or #; SP-¶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; QP-COAFES jr or sr, #, complete internship contract available in COAFES Career Services before registering; UC only; SP-COAFES jr or sr, #, complete internship contract available in COAFES Career Services before registering; UC only; S-N only) Professional experience in entomology firms or government agencies through supervised practical experience; evaluative reports and consultations with faculty advisers and employers.

Ent 4241. Ecological Risk Assessment. (3 cr; QP-#; SP-#) 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 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. Livestock Entomology. (3 cr; QP-[1005, 3005] or #; 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; QP-3005 or #; SP-3005 or #; A-F only) 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; QP-Biol 1009 or #; SP-3001 or equiv; A-F only) 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; QP-5010, biochem course or #; SP-5011, biochem course or #; A-F only) 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; QP-Biol 5041 or EBB 5122 or #; offered fall 1998 and alt yrs; SP-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; QP-3005 or #; SP-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 5275. Medical Entomology. (3 cr; QP-3005 or #, offered 1998 and alt yrs; SP-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; QP-Stat 5021 or equiv; SP-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; QP-§Agro 5321; [[3xxx or above] course in [Agro or AnSc or Hort], [3xxx or above] course in [Ent or PIPa or Soil]] or #; SP-§Agro 5321; [[3xxx or above] course in [Agro or AnSc or Hort], [3xxx or above] course in [Ent or PIPa or Soil]] or #; A-F only) Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied.

Ent 5341. Biological Control of Insects and Weeds. (3-4 cr; QP-Biol 1009, EEB 3001 grad or #; SP-3001, Biol 1009, EEB 3001 or grad; A-F only) 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; QP-5030; SP-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. (3 cr; QP-1005 or #; SP-3001 or #; A-F only) Taxonomy and natural history of aquatic insects including their importance in aquatic ecology, water resource management, recreation, and conservation. Emphasis on family-level identification of immatures and adults. Field trips scheduled to local aquatic habitats. A collection is required.

Ent 5371. Principles of Systematics. (3 cr; QP-#; offered alt yrs; SP-#; 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. Lepidopterozoology. (3 cr; QP-Ent course or #, one course each in ecology and genetics recommended; SP-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. (3 cr; QP-§5480; SP-§NSc 5481) Fundamental principles/concepts underlying cellular bases of behavior/systems neuroscience. Particular invertebrate preparations.

Ent 5900. Basic Entomology. (1-6 cr; QP-#; SP-#) 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]; QP-#; SP-#) 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 a 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; SP-§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]; QP-COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; SP-COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only) 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 4 cr]) Study of a topic in family education that is either not covered in available courses or that is not covered in sufficient breadth and depth to meet student needs and 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; SP-Human sexual behavior course, family ed course; A-F only) 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)

Examination, development, and implementation of family and consumer science curriculum in secondary schools. Emphasis on curricular perspectives from social reconstruction and cognitive processes.

FE 5303. Instructional Strategies in Family Education. (3 cr; A-F only)

Theory and research relevant to methods of teaching; development of skill in using methods; emphasis on 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; SP-5701 or Δ; A-F only)

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; SP-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]; QP-5320; SP-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]; SP-Δ; A-F only)

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]; SP-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; QP-FSoS major; 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]; SP-Soph, #)

Independent reading or writing or research under faculty supervision.

FSoS 3101. Personal and Family Finances. (3 cr; SP-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; SP-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 3103. Family Resource Management. (3 cr; SP-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 3150. Special Topics in Family Social Science. (2-4 cr [max 4 cr]; SP-[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]; SP-Jr, #)

Independent reading or writing or research under faculty supervision.

FSoS 3426. Alcohol and Drugs: Families and Culture. (3 cr; SP-\$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. Note: Course not offered after spring semester 2001.

FSoS 3427. Alcohol, Drugs, and the Brain. (1 cr; SP-\$5427)

Psychopharmacology of alcohol/drug use. Licit/illicit drugs. Mechanisms of drug action in the brain. Alcohol/drug taking practices. Influence of alcohol/drugs on behavior. Note: Course not offered after spring semester 2001.

FSoS 3428. Assessment and Treatment of Alcohol and Drug Use Issues. (3 cr; SP-\$5428)

Assessment/treatment of alcohol, other drug use problems. Theoretical/practical approaches to diagnosis, screening, treatment. Issues of loss, trauma, family, culture. Diversity issues of gender, ethnicity, social class, sexuality, disability. Note: Course not offered after spring semester 2001.

FSoS 3429. Counseling Skills Practicum I. (3 cr; SP-\$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. Note: Course not offered after spring semester 2001.

FSoS 3431. Counseling Skills Practicum II. (3 cr; QP-[3029, 3030] or #; SP-\$5431; [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. Note: Course not offered after spring semester 2001.

FSoS 3432. Chemical Abuse and Families: an Overview. (3 cr; SP-\$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. Note: Course not offered after spring semester 2001.

FSoS 3433. Group Therapy: Theory and Practice. (3 cr; SP-\$5433)

Introduction to group therapy concepts. Stages of group development, affective development, group communication. Education, support, therapy groups. Leadership roles/functions, critical incidents, therapeutic factors, group processes. Lecture, small groups. Note: Course not offered after spring semester 2001.

FSoS 3434. Gambling in America. (3 cr; SP-\$5434)

Introduction to risk-taking, gambling. Development of gambling problems. Sociological, historical, economic, public policy perspectives. Family influences, gambling among youth, aging adults. Frameworks for assessing/treating problematic gambling. Note: Course not offered after spring semester 2001.

FSoS 3435. Internship in Alcohol and Other Drug Use Problems. (2 18 cr [max 18 cr]; QP-ADCEP certificate program, #; SP-\$5435; ADCEP certificate program, #; S-N only)

Students are placed in three-four different community agencies/treatment centers. (A separate registration is required for each placement.) An 880-hour rotating clinical internship. Note: Course not offered after spring semester 2001.

FSoS 3436. Ethical Issues in Addiction Counseling. (1 cr; QP-ADCEP certificate program, #; SP-\$5436; ADCEP certificate program, #; S-N only)

Ethical issues/challenges in alcohol/drug counseling/therapy. Decision-making, values conflicts, boundary violations, client rights, professional responsibilities. Issues in relationship/family therapy, group work, cross-cultural counseling, working with special populations. Note: Course not offered after spring semester 2001.

FSoS 3437. Supervision Group. (2 cr [max 6 cr];

QP-ADCEP certificate program, #; SP-\$5437; ADCEP certificate program, #; S-N only)

Supervision of alcohol/drug use counseling in group format. Each student presents at least one tape of a client counseling session. Role-playing, extensive discussion of clinical issues. Focus on non-pathologizing models of therapy. Training tapes, readings. Note: Course not offered after spring semester 2001.

FSoS 3450. Special Topics: Addiction. (1-4 cr [max 9 cr])

Selected reading or project in alcohol/drug use/problems. Note: Course not offered after spring semester 2001.

FSoS 4101. Sexuality and Gender in Families and Close Relationships. (3 cr; QP-90 cr or [grad student in social or behavioral or educational or health science or human service program] or #; SP-[3102, 3103] 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; QP-3600; SP-[3102, 3103] 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; QP-SW 3101 or Pol 1001 or #; SP-3102, 3103 or #)

Connections between the policies that governments enact, and families and their well-being. Conceptual frameworks to identify and understand some of the influences underlying policy choices and for evaluating the consequences of such choices for diverse families.

FSoS 4104W. Family Psychology. (3 cr; QP-3600; SP-[3102, 3103] 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.

Course Descriptions

FSoS 4105. Methods in Family Research. (3 cr; QP-3260; SP-[3102, 3103, one introductory course in statistics] or #)
Scientific method. Major questions/objectives of family research. Data collection/analysis/reporting. Social context of family research.

FSoS 4150. Special Topics in Family Social Science. (2-4 cr [max 12 cr]; SP-[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; SP-[3102, 3103] 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; SP-3101 or #; A-F only)
Introduction to family financial management applications through a case study approach of the different stages in the family financial life cycle.

FSoS 4154W. Families and Aging. (3 cr; QP-3260 or 3600, SW 3202 or intro pol sci course or #; SP-3102, 3103 or #)
Aging families from diverse socioeconomic and cultural groups are examined as complex multigenerational systems interacting within ever-changing social structures.

FSoS 4155. Parent-Child Relationships. (3 cr; QP-5200 or 5202, CPsy 1301; SP-3102, 3103 or #; A-F only)
History, theories, research and contemporary practices of parent-child relationships in diverse families and 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; QP-3260 or 3600 or 5200 or #; SP-3101 or 3103 or #)
Interdisciplinary course for critical thinking about legal-economic controversies across the family life span. Principles of argumentation and debate are used to analyze controversies with the intention to prepare citizens for public decision making roles and political discourse about controversial family issues.

FSoS 4191. Independent Study in Family Social Science. (1-4 cr [max 12 cr]; SP-Sr, #)
Independent reading or writing or research under faculty supervision.

FSoS 4294. Research Internship. (1-4 cr [max 4 cr]; SP-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]; QP-3231, #; SP-2101, #; S-N only)
Directed paraprofessional work experience related to student's area of study.

FSoS 5101. Family Systems. (3 cr; QP-Intro course in psych, soc; SP-\$3102, 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]; SP-FSoS or grad student in related field)

FSoS 5426. Alcohol and Drugs: Families and Culture. (3 cr; SP-\$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. Note: Course not offered after spring semester 2001.

FSoS 5427. Alcohol, Drugs, and the Brain. (1 cr; SP-\$3427)
Psychopharmacology of alcohol/drug use. Licit/illicit drugs. Mechanisms of drug action in brain. Alcohol/drug taking practices. Influence of alcohol/drugs on behavior. Note: Course not offered after spring semester 2001.

FSoS 5428. Assessment and Treatment of Alcohol and Drug Use Issues. (3 cr; SP-\$3428)
Theoretical/practical approaches to diagnosis, screening, treatment. Issues of loss, trauma, family, culture. Diversity issues of gender, ethnicity, social class, sexuality, disability. Note: Course not offered after spring semester 2001.

FSoS 5429. Counseling Skills Practicum I. (3 cr; SP-\$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. Note: Course not offered after spring semester 2001.

FSoS 5431. Counseling Skills Practicum II. (3 cr; QP-[5029, 5030] or #; SP-\$3431; [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. Note: Course not offered after spring semester 2001.

FSoS 5432. Chemical Abuse and Families: an Overview. (3 cr; SP-\$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. Note: Course not offered after spring semester 2001.

FSoS 5433. Group Therapy: Theory and Practice. (3 cr; SP-\$3433)
Introduction to group therapy concepts. Stages of group development, affective development, group communication. Education, support, therapy groups. Leadership roles/functions, critical incidents, therapeutic factors, group processes. Lecture, small groups. Note: Course not offered after spring semester 2001.

FSoS 5434. Gambling in America. (3 cr; SP-\$3434)
Risk-taking, gambling, development of gambling problems. Sociological, historical, economic, public policy perspectives. Family influences. Gambling among youth, aging adults. Frameworks for assessing/treating problematic gambling. Note: Course not offered after spring semester 2001.

FSoS 5435. Internship in Alcohol and Other Drug Use Problems. (2-18 cr [max 18 cr]; QP-ADCEP certificate program, #; SP-\$3435; ADCEP certificate program, #; S-N only)
Students are placed in three-four different community agencies/treatment centers. (A separate registration is required for each placement.) An 880-hour rotating clinical internship. Note: Course not offered after spring semester 2001.

FSoS 5436. Ethical Issues in Addiction Counseling. (1 cr; QP-ADCEP certificate program, #; SP-\$3436; ADCEP certificate program, #; S-N only)
Ethical issues/challenges in alcohol/drug counseling/therapy. Decision-making, values conflicts, boundary violations, client rights, professional responsibilities. Issues in relationship/family therapy, group work, cross-cultural counseling, working with special populations. Note: Course not offered after spring semester 2001.

FSoS 5437. Supervision Group. (2 cr [max 6 cr]; QP-ADCEP certificate program, #; SP-\$3437; ADCEP certificate program, #; S-N only)
Supervision of alcohol/drug use counseling in group format. Each student presents at least one tape of a client counseling session. Role-playing, extensive discussion of clinical issues. Focus on non-pathologizing models of therapy. Training tapes, readings. Note: Course not offered after spring semester 2001.

FSoS 5450. Special Topics: Addiction. (1-4 cr [max 9 cr])
Selected reading or project in alcohol/drug use/problems. Note: Course not offered after spring semester 2001.

Finance (Fina)

Department of Finance

Curtis L. Carlson School of Management

Fina 3000. Finance Fundamentals. (2.67 cr; SP-[Acct 1050 or Acct 2050], at least 90 cr completed or in progress; A-F only)
Introduction to financial management principles. Money/capital markets, risk/return/valuation triad, capital budgeting, capital structure/financial leverage, cost of capital, financial performance measures, dividend policy, working-capital management, international financial management/derivatives.

Fina 3001. Finance Fundamentals. (2 cr; QP-Acct 1050, BA 1550; SP-Acct 2050, SMO 1550; A-F only)
Comprehensive introduction to financial management principles. Survey of 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, basics of international financial management/derivatives.

Fina 3111. Finance Fundamentals. (2 cr; QP-CSOM business minor; SP-CSOM business minor; A-F only)
Introduction to financial management principles. Securities markets, time value of money, applied valuation for stocks/bonds, capital budgeting basics, net present value, risk/return, cost of capital, financial leverage.

Fina 4121. Financial Markets and Interest Rates. (2 cr; QP-3100; SP-4241; A-F only)
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; QP-3200; SP-4121, 4241; A-F only)
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; QP-3000; SP-3001; A-F only)
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; QP-3000, 3100; SP-4241; A-F only)
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; QP-3000; SP-4241; A-F only)
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; QP-3000, 3300; SP-4241, 4321; A-F only)
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; QP-BFin 3200, BFin 3300; SP-4121, 4241, 4321; A-F only)
Foundations of stochastic cash flow representations, construction portfolios of futures/options, basic methods for valuing real/financial futures, swaps, options.

Fin 4641. International Finance and Risk Management. (4 cr; QP-BFin 3000; SP-3001; A-F only) 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. (4 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. (4 cr; SP-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. (4 cr; SP-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. (4 cr; SP-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; SP-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; SP-3011)
Discussion of novels, short stories, plays, and articles complemented by structural, stylistic, and vocabulary-building exercises.

Fin 4001. Beginning Finnish. (2 cr; SP-\$1001, 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; SP-\$1002, 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; SP-\$1003, 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; SP-\$1004, 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 and Wildlife 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, and career opportunities.

FW 1002. Wildlife: Ecology, Values, and Human Impact. (3 cr)
Controversial issues involving specific wildlife management principles and techniques. For students without natural science background interested in natural resource topics, especially wildlife management issues.

FW 2001. Introduction to Fisheries, Wildlife, and Conservation Biology. (3 cr; QP-Biol 1201 or Biol 1009; SP-Biol 1001 or Biol 1009)
Theory and practice of fisheries and wildlife management including single species populations, ecosystem, and landscape approaches. The biota, habitat, and 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; QP-Math 1031; SP-Math 1031; A-F only)
Basic statistical concepts such as probability, sampling space, and frequency distributions. Descriptive statistics: sample tests, linear regression (simple and multiple), ANOVA, goodness of fit, nonparametric method and other relevant selected topics (e.g., clustering and classification).

FW 4106. Important Plants in Fisheries and Wildlife Habitats. (1 cr; QP-5600; SP-4108; A-F only)
Field identification of important plants in fisheries and wildlife habitats.

FW 4108. Field Methods in Research and Conservation of Vertebrate Populations. (3 cr; QP-Biol 3008; SP-Biol 3407; A-F only)
Planning and implementation of research and management projects; collect and analyze data in groups; group and individual oral and written reports; each student keeps a field journal.

FW 4129. Mammalogy. (4 cr; QP-Biol 1106 or 3011 or #; SP-Biol 2012 or #; A-F only)
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; QP-Biol 1106 or 3011; SP-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; QP-FW upper div honors, #; SP-FW upper div honors, #; A-F only)
Current topics presented by faculty/students. Lecture/discussion.

FW 4291. Independent Study: Fisheries. (1-5 cr; QP-#; SP-#)
Individual field, library, and lab research in fisheries.

FW 4292. Special Lectures: Fisheries. (1-5 cr; QP-#; SP-#)
Lectures in special fields of fisheries given by a visiting scholar or regular staff member.

FW 4391. Independent Study: Wildlife. (1-5 cr; QP-#; SP-#)
Individual field, library, and lab research in wildlife.

FW 4392. Special Lectures: Wildlife. (1-5 cr; QP-#; SP-#)
Lectures on special topics of wildlife given by a visiting scholar or a staff member.

FW 4401W. Introduction to Fish Physiology and Behavior. (4 cr; QP-Biol 1009; SP-Biol 1001 or 1009)
The physiology of fishes and their behavior, with an emphasis how life in aquatic environment has influenced fish biology. Includes examination of ionic and osmotic balance, sensory systems, gas exchange, endocrinology, growth, foraging, locomotion, reproduction, orientation and migration, and toxicology.

FW 4565. Fisheries and Wildlife Ecology and Management: Field Trip. (1 cr; QP-#; SP-#; S-N only)
Ten-day field trip to Wyoming and points en route during spring break emphasizing a broad range of fisheries and wildlife management including big game, waterfowl, and endangered species.

FW 4701. Fisheries and Wildlife Problem Solving. (2 cr [max 2 cr]; QP-FW sr or grad student or #; SP-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; QP-FW upper div honors, #; SP-FW upper div honors, #; A-F only)
Independent research project supervised by faculty member.

FW 4802H. Honors Research. (2 cr; QP-FW upper div honors, #; SP-FW upper div honors, #; A-F only)
Completion of honors thesis. Oral report.

FW 5003. Human Dimensions of Biological Conservation. (3 cr; QP-[Biol 1201 or Biol 1009], Biol 3008; SP-[Biol 1001 or Biol 1009], Biol 3407)
Survey of social, psychological, economic, and policy aspects of managing/conserving wildlife, fisheries, and related resources.

FW 5051. Analysis of Populations. (3-4 cr; QP-Biol 1009 or Biol 1201, Stat 3011 or Stat 5021 or #; SP-Biol 1001 or Biol 1009, FW 4001 or Stat 3011 or Stat 5021 or #)
Factors involved in the regulation, growth, and general dynamics of populations. Data needed to describe populations, population growth, population models, and regulatory mechanisms.

FW 5411. Aquatic Toxicology. (3 cr; QP-Biol 3008 or EEB 5601; SP-Biol 3407 or EEB 4601)
Pollution assessment approaches, biological effects, fate and flow of contaminants in aquatic systems, and major types of pollutants.

FW 5455. Sustainable Aquaculture. (3 cr; QP-Biol 1106, Chem 1051, Math 1031 or #; SP-Biol 2012, Chem 1021, Math 1031 or #; A-F only)
Role of aquaculture in fisheries management, biodiversity rehabilitation, and food production around the world. Implications for the sustainability of human-environment interactions in different societies. Principles of fish husbandry.

FW 5571. Avian Conservation and Management. (3 cr; QP-EEB 5134 or grad or #; SP-EEB 4134 or grad or #)
Current problems in avian conservation and management with equal emphasis on nongame, wetland, and game birds.

FW 5601. Fisheries Population Analysis. (3 cr; QP-Biol 3008, Math 1251, [Stat 3012 or Stat 5021]; SP-[4001 or Stat 5021], Biol 3407, [Math 1192 or Math 1271]; A-F only)
Introduction to theory/methods for estimating vital statistics of fish populations. Using microcomputers/statistical software to describe, analyze, and model attributes of fish populations. Case studies from literature of marine/freshwater fisheries management.

FW 5603W. Habitats and Regulation of Wildlife. (3 cr; QP-Biol 3008; SP-Biol 3407; A-F only)
Environmental interactions of wildlife at both population and community levels; environmental threats from human activities; habitat management practices; objectives, policies, and regulations in population management.

Course Descriptions

FW 5604W. Fisheries Ecology and Management. (3 cr; QP–EEB 5601; SP–EEB 4601)

Emphasis on managed species and systems. Applied aquatic and fish ecology related to fisheries. Role of planning in fisheries management. Application of management tools and assessment of their efficacy.

FW 5621. Geographic Information Systems for Fisheries, Wildlife and Biology Conservation. (3 cr)

Hands-on experience with GIS as a tool for understanding, analyzing, and managing ecological systems. ARC/INFO and how to apply it to problems in fisheries, wildlife, and biological conservation.

FW 5625. Wildlife Handling and Immobilization for Research and Management. (2 cr; QP–General biology, [grad student or vet med student or FW sr]; SP–General biology, [grad student or vet med student or FW sr], Δ; S-N only)

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 and College of Human Ecology

FScN 1011. The Science of Food. (4 cr)

Physical and chemical changes occurring during common food preparation techniques are evaluated. Experiments conducted to measure changes in specific food quality attributes.

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; QP–High school [biology, chemistry]; SP–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; SP–\$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; QP–Chem 1002 or Chem 1052; SP–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; QP–Chem 1052, 1612; SP–Chem 1022, 1112)

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. (2 cr; QP–1612; SP–1112)

Application of theories/principles of learning, behavior change, instructional methods to nutrition education in community settings.

FScN 3615. Sociocultural Aspects of Food, Nutrition, and Health. (3 cr; QP–1612; SP–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; QP–1612, admitted to Coordinated Program in Dietetics, #; SP–1112, admitted to Coordinated Program in Dietetics, #; A-F only)

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; QP–3102, 3732; SP–3102 or ¶3102 or 3732 or ¶3732; A-F only)

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; QP–3102; SP–[3102 or ¶3102], [3732 or ¶3732]; A-F only)

Planning, preparing, delivering, serving, managing foods served away from home.

FScN 3796. Field Experience in Food Service Management. (3 cr; QP–3732, admitted to Coordinated Dietetics Program, #; SP–[3732 or ¶3732], admitted to Coordinated Dietetics Program, #; A-F only)

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]; QP–FScN undergrads, #; UC only; SP–FScN undergrads, #; UC only; A-F only)

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; QP–\$Agro 5200, \$ApEc 5790, \$CAPS 5280, jr or sr or grad; SP–\$Agro 4103, \$ApEc 4103, \$CAPS 4103; 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; QP–3102, BioC 3021; SP–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; QP–1102, VPB 3103 or MicB 5105; SP–1102, VPB 2032 or MicB 3301 or MicB 2032)

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; QP–VPB 3103 or MicB 5105; SP–¶4121; A-F only)

Microbiological methods for analysis of foods. Use of microorganisms for production of foods.

FScN 4131. Food Quality. (3 cr; QP–5110, 5120; SP–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]; QP–#; SP–#)

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]; QP–Undergrads, #; SP–Undergrads, #)

Individual lab or library research in an area related to food science or nutrition.

FScN 4312W. Food Analysis. (4 cr; QP–5110, Stat 3012; SP–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; QP–3136, Math 1252, Phys 1042; SP–3102, Math 1272, [Phys 1102 or Phys 1302]; A-F only)

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; QP–5135; SP–4331; A-F only)

Application/integration of engineering principles to unit operations used in food production. Equipment design. Effects of processing on food quality (chemical, microbiological).

FScN 4341. Sensory Evaluation of Food Quality. (3 cr; QP–3112, 5110, 5120, Stat 3012; SP–4131, Stat 3011; A-F only)

Fundamentals of sensory perception. Test designs and methods used in studying sensory qualities of foods.

Group project on matching use of sensory and physical properties of commercial product. Design a quality control system for microbial, sensory, and nutritional quality of selected products.

FScN 4342. Properties of Water in Foods. (4 cr; QP–5135; SP–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. (3 cr; QP–5110, 5120, 5135; SP–4111, 4121, 4331)

Demonstration and application of the basic concepts of food engineering and processing to the production of fluid, concentrated, and dehydrated dairy products.

FScN 4344. Technology of Fermented Dairy Products. (4 cr; QP–5110, 5120, 5135; SP–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; QP–5110, 5120, 5136; SP–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; QP–[5110, 5120] or [5110, 5135] or [5120, 5135]; SP–[4111, 4121] or [4111, 4131] or [4121, 4131]; A-F only)

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 4451. Food Marketing Economics. (3 cr; QP–ApEc 3101; SP–\$ApEc 4451; ApEc 3001 or Econ 3103)

Food consumption trends; consumer food behavior; marketing strategies; consumer survey methodology; food distribution and retailing system; food policy issues related to food marketing. Individual and group projects.

FScN 4596. Field Experience: Community Nutrition. (3 cr; QP–Admitted to first year Coordinated Program in Dietetics, #; SP–Admitted to first year Coordinated Program in Dietetics, #; A-F only)

Application of nutrition knowledge in the solution of problems related to health promotion. Assigned readings, discussion, and experiences in community agencies.

Forest Resources (FR)

Department of Forest Resources

College of Natural Resources

FScN 4612. Human Nutrition. (3 cr; QP—Chem 1052, 1612, PhsI 3051; SP—Chem 1022, 1112, PhsI 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; QP—3612, BioC 3021, Stat 3011; SP—4612, BioC 3021, Stat 3011)
Lab in chemical/biochemical methods of analysis of nutritional status.

FScN 4614. Community Nutrition. (3 cr; QP—1612; SP—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; QP—5620, BioC 3021; SP—4612, PhsI 3051, BioC 3021; A-F only)
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; QP—5666; SP—4665; A-F only)
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.

FScN 4696. Field Experience: Medical Nutrition Therapy I. (6 cr; QP—Second year students in Coordinated Program in Dietetics or #; SP—Second year students in Coordinated Program in Dietetics or #; A-F only)
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; QP—3732, Mgmt 3001; SP—3732, Mgmt 3001; A-F only)
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; QP—Second year students in Coordinated Program in Dietetics or #; SP—Second year students in Coordinated Program in Dietetics or #; A-F only)
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; QP—Admitted to Coordinated Program in Dietetics or #; SP—[4696, admitted to Coordinated Program in Dietetics] or #; A-F only)
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; QP—Admitted to Coordinated Program in Dietetics or #; SP—[4896, Admitted to Coordinated Program in Dietetics] or #; A-F only)
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; QP—5120; SP—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; QP—1102; SP—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. Physicochemistry of Food. (2 cr; QP—5110; SP—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; QP—5110, 5135; SP—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; QP—5312; SP—4312)
Introduction to various procedures for analysis of structure and organization in raw and processed food.

FScN 5461. Food Packaging. (2 cr; QP—1102, 3102, Phys 1042; SP—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 5511. Meat, Poultry, and Seafood Protein Processing. (2 cr; QP—1102, Chem 3305; SP—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; QP—Biol 1009, Chem 1052; SP—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; QP—3612, BioC 3021, PhsI 3051; SP—4612, BioC 3021, PhsI 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; QP—3612, BioC 3021, PhsI 3051; SP—4612, BioC 3021, PhsI 3051)
Nutritional, biochemical, and physiological aspects of vitamins/essential minerals in human/experimental-animal models.

FScN 5623. Regulation of Energy Balance. (2 cr; QP—5620; SP—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.

FR 1001. Orientation and Information Systems. (1 cr; A-F only)
Curricula offerings. Liberal education requirements. Careers in forest resources, urban forestry, and recreation resource management. Summer jobs/internships. Computers/computer-based tools as they apply to forestry/related coursework. Techniques for information retrieval.

FR 1101. Dendrology. (3 cr)
Identification nomenclature, classification, and distribution of important forest trees/shrubs. Use of keys, field, and lab methods of identification.

FR 2101. Forest Plants. (1 cr; QP—Biol 1201 or Biol 1009; SP—Biol 1001 or Biol 1009; A-F only)
Field identification of trees, shrubs, and nonwoody vascular plants. Emphasizes concept of plant communities, soil site relationships, and wildlife values. Taught at Itasca State Park.

FR 2102. Forest Ecology: Field Experience. (2 cr; QP—Biol 1201 or Biol 1009, Chem 1001 or Chem 1051; SP—Biol 1001 or Biol 1009, Chem 1011 or Chem 1021; A-F only)
Taught in Itasca State Park. Field examination of forests in terms of soils, ecological characteristics of trees, community-environment relationships, stand development, succession, and regeneration ecology.

FR 2104. Forest Measurement Techniques. (1 cr; QP—[High school or college trigonometry] or #; SP—[High school or college trigonometry] or #; A-F only)
Introduction to land survey, tree/stand measurement, and basic forest sampling techniques. Taught at Itasca State Park.

FR 3104. Forest Ecology. (4 cr; QP—Two biol courses, chem course; SP—\$5104; two biol courses, chem course; A-F only)
Form/function of forests as ecological systems. Characteristics/dynamics of species, populations, communities, landscapes, ecosystem processes. Examples applying ecology to forest management. Emphasizes fire ecology. Weekend field trip (required). Weekly recitations.

FR 3251. Role of Renewable Natural Resources in Developing Countries. (1 cr; SP—\$5251; A-F only)
International perspectives on important resource issues including integration of natural resource, social, and economic considerations. Overviews of issues and case studies.

FR 3293. Directed Study Experience. (1-5 cr; QP—#; SP—#)
Student conducts a study/project on a topic of personal interest in consultation with faculty member. The course is documented by an initial proposal and reports of accomplishments.

FR 3501. Arboriculture. (3 cr; QP—1100 or Hort 1021, Biol 1103; SP—1101 or Hort 1012, Biol 2022)
Selection and culture of trees for urban spaces. Emphasis on tree selection, site preparation, plant health care management, and diagnosing urban tree problems. Designed for plant science or urban forestry majors as an introduction to tree health management.

FR 3601. Elements of Surveying. (1 cr; QP—High school or college trigonometry; SP—High school or college trigonometry; A-F only)
Basic concepts of elementary plane surveying for use in natural resource assessment. Includes measurements of distance, elevation, angle and direction using transits, levels, total stations, and GPS equipment. Elements of coordinate systems, datum planes, and maps.

FR 4114. Forest Hydrology and Watershed Management. (3 cr; QP—Biol 1009, Chem 1052, Math 1142, Phys 1001 or #; SP—Biol 1009, Chem 1001, Phys 1001 or #)
Introduction to the hydrologic cycle and hydrologic processes. Effects of forest management and other types of land use on water yield, stormflow, erosion-sedimentation, and water quality. Concepts, principles, and applications of watershed management.

Course Descriptions

FR 4118. Tree Biology. (2 cr; QP—Chem 1002 or Chem 1052, 6 cr biology; SP—Chem 1011 or Chem 1021, Biol 2022; A-F only)
The structure and physiological functioning of trees. Relations of tree biology to ecology and management.

FR 4131. Geographical Information Systems for Natural Resource Analysis. (3 cr; QP—Jr; SP—Jr; A-F only)
An introduction to GIS focusing on natural resources. Topics include data structures; sources, collection, and quality; geodesy and map projections; spatial analyses; cartographic modeling. Laboratory exercises complement theory covered in lecture.

FR 4200H. Honors Seminar. (1 cr; QP—FR upper div honors, #; SP—FR upper div honors, #; A-F only)
Current topics presented by faculty/students. Lectures. Discussions.

FR 4218. Assessment and Modeling of Forests. (3 cr; QP—Math 1142 or Math 1251-1252, NRES 5210, Stat 3011 or Stat 5121; SP—Math 1142 or Math 1271-1272, Stat 3011; A-F only)
Sample survey techniques; measurement and sampling methods for forest vegetation; tree and stand growth modeling; landscape processes, characterization, and modeling.

FR 4232W. Management of Recreational Lands. (4 cr; A-F only)
Understanding and applying recreation management tools from a public agency perspective. Management concepts such as social carrying capacity, ROS, LAC, BBM, and VERP are examined and used for various projects.

FR 4259. Analysis of Outdoor Recreation Behavior. (3 cr; QP—3232, RRM major; SP—4232, RRM major; A-F only)
Environmental framework for understanding recreation/leisure behavior. Contributions of several disciplines. Cultural trends. Management implications for public/private management of recreational/leisure settings.

FR 4262. Remote Sensing of Natural Resources. (3 cr; QP—Phys 1001 or Phys 1041; SP—Phys 1001 or Phys 1101)
Principles and techniques of remote sensing. Applications to natural resource inventory and mapping, land use analysis, and monitoring environmental and natural resources. Photographic and digital sensing approaches considered. Lab gives hands-on experience with aerial photography and digital imagery.

FR 4411. Silviculture Systems. (3 cr; QP—3104; SP—3104)
Introduction to silvics, reforestation and restoration techniques, intermediate stand treatments, and silvicultural systems.

FR 4431. Timber Harvesting and Road Planning. (1 cr; QP—5100; SP—4411 or #)
Timber harvesting and road planning terminology, basic concepts of harvesting systems, equipment, costs, best management practices, road planning concepts, and the relationship to forest management. Fundamentals of preparation and administration of timber sales.

FR 4461. Water Quality: The International Dimension. (3 cr; QP—Water resource course; SP—Water resource course)
Active learning approaches are used to understand how culture drives water quality management and how and why that management varies among countries. Become familiar with multinational river basin compacts and policies for international management.

FR 4471. Forest Management and Planning. (3 cr; QP—5218, ApEc 1101 or Econ 1101, NRES 5260 or #; SP—4218, ApEc 1101 or Econ 1101, NRES 3261 or #; A-F only)
Forest management decisions at the stand and forest-wide level; forest regulation principles and techniques; forest management scheduling models including linear programming and simulation; economic trade-off and impact analysis in forest planning.

FR 4480. Topics in Natural Resources. (1-3 cr [max 12 cr]; QP—#; SP—#)
Lectures in special fields of forest resources given by a visiting scholar or regular staff member. Topics specified in *Class Schedule*.

FR 4501. Urban Forest Management. (3 cr; QP—5500; SP—3501)
Basic and advanced management concepts for the green infrastructure of cities, towns, and communities. The urban forest is studied as a social as well as a biological resource. Emphasis on management of urban forest ecosystem to maximize benefits to people.

FR 4611. Field Silviculture. (3 cr; QP—5100; SP—4411)
Industrial/state silviculture practices, applied silvicultural research. Developing silvicultural prescriptions for artificial/natural regeneration, intermediate stand treatments, silvicultural options for alternative forest products in conifer/hardwood stands. Silvicultural practices as implemented on industrial/publicly-owned lands. Field intensive.

FR 4615. Remote Sensing and Resource Assessment: Field Applications. (2 cr; QP—5218, 5262; SP—4218, 4262; A-F only)

Field applications of remote sensing, sampling and measurement methods to inventory, mapping and monitoring forest and other natural resources. Offered at Cloquet Forestry Center.

FR 4621. Timber Harvesting and Road Planning: Field Applications. (2 cr; QP—#; SP—4411, 4431)
Field application of best management practices, preparation/administration of timber sales, forest road design. On-site evaluations of timber harvesting systems. Offered at Cloquet Forestry Center.

FR 4801H. Honors Research. (2 cr; QP—FR upper div honors, #; SP—FR upper div honors, #; A-F only)
First semester of independent research project supervised by faculty member.

FR 4802H. Honors Research. (2 cr; QP—FR upper div honors, #; SP—FR upper div honors, #; A-F only)
Honors thesis. Oral report.

FR 4894. Directed Research. (1-3 cr [max 10 cr]; QP—#; SP—#)
Research project on topic of personal interest under guidance of faculty mentor. Initial proposal. Reports.

FR 5104. Forest Ecology. (4 cr; QP—[Biol course, chem course, grad student] or #; SP—\$3104; [biol course, chem course, grad student] or #; A-F only)
Form/function of forests as ecological systems. Characteristics/dynamics of species, populations, communities, landscapes, ecosystem processes. Examples apply ecology to forest management. Emphasizes fire ecology. Weekend field trip (required). Weekly recitations.

FR 5142. Tropical Forest Ecology. (3-4 cr; QP—3xxx or above ecology course; SP—3xxx or above ecology course)
Ecological principles related to form, function, and development of wet and dry tropical forests at organismal, community, and ecosystem scales. Succession, productivity, biodiversity, sustainability, agroforestry, and management alternatives. Natural distribution of forest types; causes, consequences, and extent of deforestation.

FR 5146. Dynamics of Global Change. (3-4 cr; QP—3xxx or above ecology course; SP—3xxx or above ecology course)
Implications of global change upon wild and cultivated vegetation including forests, grasslands, and agricultural ecosystems. Responses at ecosystem, community, organismal, and physiological scales. Potential climate change; elevated atmospheric concentrations of carbon dioxide, ozone, and other trace gases; acid deposition; and other pollutants.

FR 5153. Forest and Wetland Hydrology. (3 cr; QP—5114 or #; SP—Basic hydrology course or #)
Current topics, problems, and methods associated with forest and wetland hydrology. The hydrologic role of forest vegetation in snow and rainfall regimes. Analytical methods and models to evaluate effects of vegetation management in uplands and wetlands on the amount and timing of water flow.

FR 5161. Forest Biology and Measurements: Field Experience. (2 cr; QP—#; SP—#; A-F only)
Forest plant identification, forest community description/dynamics, mapping forests, tree/stand measurement. Taught at Itasca State Park.

FR 5228. Advanced Topics in Assessment and Modeling of Forests. (3 cr; QP—5218 or equiv, NRES 5210 or equiv, Stat 5021 or equiv; SP—4218, Math 1272, Stat 5021; A-F only)
Recently developed mathematics, computer science, and statistics methodologies applied to forest resource functioning, management, and use problems.

FR 5251. Role of Renewable Natural Resources in Developing Countries. (1 cr; QP—Sr or grad or #; SP—\$3251; sr or grad or #; A-F only)
International perspectives on important resource issues, including integration of natural resource, social, and economic considerations. Overviews of issues and case studies.

FR 5264. Advanced Forest Management Planning. (2 cr; QP—5270 or #; SP—4471 or #)
Strengths and weaknesses of modeling tools used in forest planning. Emphasis on problem sets and applications ranging from stand-level management to regional timber supply analyses and landscape-level planning. Review of recent literature and practical problems with implementation.

FR 5403. Fundamentals of Natural Resource Education. (1-2 cr)
For elementary teachers and others with instructor permission. Focus on understanding the forest community, the tools used by foresters, and awareness of effective forest management practices. Forestry-related indoor and outdoor activities which can be translated for classroom use.

FR 5412. Advanced Remote Sensing. (3 cr; QP—5262 or #; SP—4262)

Provides fundamental and working knowledge of biophysical-quantitative remote sensing and its applications to monitoring environmental and natural resources. Includes experience working with digital remote sensing data, models, and image processing.

FR 5700. Colloquium in Natural Resources. (1-3 cr; QP—Varies with topic; SP—Varies with topic)
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. (4 cr)
Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings.

Fren 1002. Beginning French. (4 cr; SP—1001 or equiv)
Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings.

Fren 1003. Intermediate French. (4 cr; SP—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. (4 cr; SP—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. (4 cr; SP—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 1102. Beginning French II, Transition. (3.33 cr; QP–French 1101; A-F only)
Basic listening, speaking, reading, and writing skills. Emphasizes communicative competence. Cultural readings.

Fren 1103. Beginning French III, Transition. (3.33 cr; QP–1102; A-F only)
Basic listening, speaking, reading, and writing skills. Emphasizes communicative competence. Cultural readings.

Fren 3010. French Expression. (3 cr [max 6 cr])
Intensive work in oral/written communication.

Fren 3014. French Phonetics. (2 cr; SP–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; SP–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; SP–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; SP–3014, 3015)
Intensive work in oral expression, listening comprehension. Incorporates wide variety of cultural topics.

Fren 3019. French Diction and Speaking. (2 cr; SP–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; SP–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; SP–3015 or equiv)
Close critical analysis of poetry, prose fiction, and plays. Introduction to literature and methods of literary analysis.

Fren 3110. Medieval Stories. (3 cr [max 9 cr]; SP–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 3171. The Unruly Subject(s) of Classicism: Writing, History, Power in Ancient Régime France. (3 cr; SP–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; SP–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; SP–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 3251. French Poetry. (3 cr; SP–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 3261. Dramas of Culture: 20th-Century French and Francophone Theater. (3 cr; SP–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]; SP–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 3321. Producing the Bourgeois Subject: The Sense of Self in 18th-Century French Literature. (3 cr; SP–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 3322. Literature and the Making of Modern France: 20th-Century Perspectives. (3 cr; SP–3101)
Developments of literary culture of 20th-century France in the context of historical events and social transformations.

Fren 3323. Literature of Revolution and Upheaval. (3 cr; SP–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 3324. Legal Issues in French Novels Since the Revolution. (3 cr; SP–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 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 3368. Coming of Age. (3 cr; SP–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 3371. Writing Crisis in (Post) Modern Times. (3 cr; SP–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 3382. Modern Times: Literature of the 19th and 20th Centuries. (3 cr; SP–3101)
Various 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 3401. Québécois Literature. (3 cr; SP–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; SP–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; SP–\$5501; 3014, 3015, Ling 3001 or #)
Advanced study of the sound system of contemporary French.

Fren 3502. Structure of French: Morphology and Syntax. (3 cr; SP–\$5502; 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; SP–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; SP–\$5531; 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; SP–3015)
Roman occupation of Gaul to 1715.

Fren 3602. French Civilization and Culture II. (3 cr; SP–3015)
1705 to present.

Fren 3650. Topics in French/Francophone Cultures. (3 cr [max 9 cr]; SP–3015)
Focus on aspects of French and/or Francophone cultures in various historical, social, political, and geographical contexts.

Fren 3701. Reading Libertinage: Dangerous Lessons in Translation. (3 cr; SP–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 3705. Atlantic Crossings: The French View Americans (and Vice Versa). (3 cr; SP–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; SP–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 3801. 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.

Fren 4101W. Seminar in French Studies. (3 cr; SP–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]; SP–3502 or #)
Topics to be selected from French syntax, pragmatics, discourse analysis, or sociolinguistics.

Fren 4970. Directed Readings. (1-4 cr [max 9 cr]; SP–#)
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 5251. Promenades Poétiques: The Subject in Motion. (3 cr; SP–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 5261. The Returns of Tragedy. (3 cr; SP–3111 or above)
Tragedy as dramatic form in relation to social order, myth and history, and theatre.

Fren 5271. "To Change or not to Change?": Speculations on (Post) Modern French Texts. (3 cr; SP-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; SP-# 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]; SP-3101 or equiv)
Problem, period, author, or topic of interest. See *Class Schedule*.

Fren 5479. Post/Colonial Francophone Literatures. (3 cr; SP-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; SP-\$3501; [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; SP-\$3502; 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; SP-\$3531; 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.

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 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 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

BC—Base Curriculum
TC—Transition Curriculum
CE—Commanding English

GC 0623. Geometry: Programmed Study. (0 cr; QP-0621 or equiv; SP-[4 cr equiv]; [0721 or GC math placement], #; BC; UC only; A-F only)
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; SP-[4 cr equiv]; #; BC; UC only; A-F only)
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.

GC 0711. Introduction to Basic Mathematics. (0 cr; SP-[4 cr equiv]; \$0611, \$0615, \$1434; BC; IDL only; A-F only)
Problem-solving. Concepts/procedures of basic math. Whole numbers, fractions, decimals, ratios, percents, geometric concepts, signed numbers, variables, simple algebraic equations, word problems.

GC 0712. Introductory Algebra, Part I. (0 cr; QP-0611 or 0615 or equiv; SP-[4 cr equiv]; \$0616, \$0621, \$0716, \$0721, \$0722, \$1435; GC math placement; BC; A-F only)
Learning/using behaviors that increase probability of success in mathematics courses. Properties, concepts, and procedures of arithmetic fractions, percents, unit conversions, and simple geometric figures. Signed numbers, equations, inequalities, algebraic word problems.

GC 0713. Introductory Algebra, Part II. (0 cr; SP-[4 cr equiv]; \$616, \$0617, \$0621, \$0717, \$0721, \$0722, \$1435; 0712, #; BC; A-F only)
Learning/using behaviors that increase the probability of success in mathematics courses. Rectangular graphs, exponents, polynomials, factoring, rational expressions, linear modeling, algebraic word problems. Continuation of 0712.

GC 0716. Introductory Algebra, Part I (Computer). (0 cr; QP-0611 or 0615 or equiv; SP-[4 cr equiv]; \$0616, \$0621, \$0712, \$0721, \$0722, \$1435; GC math placement; BC; A-F only)
Learning/using behaviors that increase probability of success in mathematics courses. Properties, concepts, and procedures of arithmetic fractions, percents, unit conversions, and simple geometric figures. Signed numbers, equations, inequalities, algebraic word problems. Computer multimedia presentation: no lectures.

GC 0717. Introductory Algebra, Part II (Computer). (0 cr; SP-[4 cr equiv]; \$0616, \$0617, \$0621, \$0713, \$0721, \$0722, \$1435; 0712, 0716, #; BC; A-F only)
Learning/using behaviors that increase probability of success in mathematics courses. Rectangular graphs, exponents, polynomials, factoring, rational expressions, linear modeling, algebraic word problems. Continuation of 0712 or 0716. Computer multimedia presentation: no lectures.

GC 0721. Introductory Algebra. (0 cr; QP-0611 or 0615 or equiv; SP-[4 cr equiv]; \$0616, \$0617, \$0621, \$0712, \$0716, \$0717, \$0722, \$1435; GC math placement; BC; A-F only)
Concepts/procedures of algebra I. Signed numbers, expressions, equations, inequalities, systems, exponents, polynomials, factoring, rational expressions, graphs, word problems.

GC 0722. Introductory Algebra (Computer). (0 cr; QP-0611 or 0615 or equiv; SP-[4 cr equiv]; \$0616, \$0617, \$0621, \$0712, \$0713, \$0716, \$0717, \$0721, \$1435; GC math placement; BC; A-F only)
Concepts/procedures of algebra I. Signed numbers, expressions, equations, inequalities, systems, exponents, polynomials, factoring, rational expressions, graphs, word problems. Computer multimedia presentation: no lectures.

GC 0731. Intermediate Algebra. (0 cr; QP-Grade of at least C in [0625 or equiv]; SP-[4 cr equiv]; \$0618, \$0625, \$0631, \$0732, \$1443, \$1444, \$1445, \$1446; grade of at least C in [0713 or 0717 or 0721 or 0722] or GC math placement; BC; A-F only)
Absolute value, systems. Linear, quadratic, rational, exponential, logarithmic functions. Radicals, conic sections, sequences, series, binomial theorem.

GC 0732. Intermediate Algebra (Computer). (0 cr; QP-Grade of at least C in [0625 or equiv]; SP-[4 cr equiv]; \$0618, \$0625, \$0631, \$0731, \$1443, \$1444, \$1445, \$1446; grade of at least C in [0713 or 0717 or 0721 or 0722] or GC math placement; BC; A-F only)
Absolute value, linear, quadratic, rational, exponential, logarithmic functions. Radicals, conic sections, sequences, series, binomial theorem. Computer multimedia presentation: no lectures.

GC 1041. Developing College Reading. (2 cr; SP-CE enrollment, #; BC)
Comprehension and study strategies for reading college-level textbooks. Previewing a textbook for content and organization, underlining and making margin notes, outlining, anticipating test questions, and interpreting technical vocabulary. For non-native speakers of English only. Paired with a designated content course.

GC 1042. Reading in the Content Area. (2 cr; SP-CE enrollment, #; BC)
Practice reading skills and strategies for a content area. Previewing and predicting content and organization, note taking, outlining, anticipating test questions, and interpreting technical and sub-technical vocabulary. For non-native speakers of English only. Paired with designated content course.

GC 1051. Introduction to College Writing: Workshop. (2 cr; SP-\$1407, \$1421 or \$1422; BC)
For non-native speakers of English enrolled in GC 1421 or GC 1422. Develop language editing strategies through review of linguistic features of standard written English and attention to style and language in writing. Small-group activities and in-group or individual conferences.

GC 1076. Career Planning Strategies. (2 cr; SP-BC)
Major issues in career/major planning. Self-understanding/management, importance of human relations in career success. Capitalizing on one's education, experiences, talents during job search.

GC 1081. Academic Development Seminar: Supplemental Instruction in Social Sciences. (1 cr; SP-\$specific content course, adviser approval after one 1081-1085 regis; BC; A-F only)
Introduces students to successful methods of study in social science courses: note taking, exam preparation, and time management. Includes specific writing tasks, critical thinking, research methods, and essay and presentation styles associated with disciplinary content.

GC 1082. Academic Development Seminar: Supplemental Instruction in the Sciences. (1 cr; SP-\$specific content course, adviser approval after one 1081-1085 regis; BC; A-F only)
Introduces students to successful methods of study in science courses, including note taking, exam preparation, and time management. Specific problem solving techniques, augmented problem sets, writing tasks, and presentation styles associated with disciplinary content.

GC 1083. Academic Development Seminar: Supplemental Instruction in the Humanities. (1 cr; SP-\$specific content course, adviser approval after one 1081-1085 regis; BC; A-F only)
Introduces students to successful methods of study in humanities courses: note taking, exam preparation, and time management. Specific writing tasks, critical thinking skills, research methods, and essay and presentation styles associated with disciplinary content.

GC 1084. Academic Development Seminar:

Supplemental Instruction in Mathematics. (1 cr; SP—[specific content course, adviser approval after one 1081-1085 regis; BC; A-F only)
Introduces students to successful methods of study in mathematics courses, including note taking, exam preparation, and time management. Necessary math background, specific problem-solving techniques, and the application of mathematical concepts associated with disciplinary content.

GC 1085. Academic Development Seminar:

Supplemental Instruction in Composition. (1 cr; SP—[specific content course, adviser approval after one 1081-1085 regis; BC; A-F only)
Introduces students to successful methods of study in composition courses, including note taking, exam preparation, and time management. Specific writing tasks, research methods, and essay and presentation styles associated with disciplinary content.

GC 1086. Freshman Seminar. (2 cr; SP-BC; 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 and writing assignments, and classroom exercises and experiences.

GC 1111. Science in Context: Weather and Climate.

(4 cr; SP-BC)
Basic scientific principles and concepts are applied in the context of the atmosphere and its weather and climate. Learn how familiar types of weather happen, forecast weather, and predict regional climates. (3 lect, 2 lab hrs per wk)

GC 1122W. Ecological Evaluation of Environmental Problems. (3 cr; SP-BC)

Relating ecological concepts (energy flow, material cycling) to cause and 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 1131W. Principles of Biological Science. (4 cr; SP-BC)

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; SP-BC)

Health/disease examined by organ system (e.g., urinary, reproductive). Access to lecture material/activities via Internet. No lab.

GC 1133. Nature Study. (3 cr; SP-BC)

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 and scientific literature.

GC 1135. Human Anatomy and Physiology. (4 cr; SP-BC)

Health/disease examined by organ systems (e.g., urinary, reproductive). Access to instructional material/activities via Internet. Lecture/lab.

GC 1137. Biological Science: The Human Body Laboratory. (2 cr; QP—Transition course; completion of GC 1132 under quarter system; offered for a limited number of semesters; BC)

Lab experience - Form and function of gross mammalian anatomy through dissection of preserved materials (skeletal, muscular, digestive, circulatory, nervous, urinary, and reproductive systems). Microscopic examination of tissues and organs. Exploration of mammalian physiology, with emphasis on experiments, analyzing, and interpreting data.

GC 1161. Solar System Astronomy. (4 cr; SP-BC)

Planets, satellites, asteroids, comets, and meteorites. The celestial sphere, coordinate systems, time intervals, motions and physical attributes of planets and their satellites, instruments used by astronomers, and space probes. (UC only)

GC 1162. Stellar Astronomy. (4 cr; SP-BC)

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. (UC only)

GC 1163. Physical Systems: Principles and Practices.

(4 cr; QP-0616 or 0621 or equiv; SP-0713 or 0721 or equiv; BC)

Principles/concepts that govern matter, energy, and motion. Structure/states of matter, potential/kinetic energy, thermodynamics, mechanics, electricity, radiant energy, and sound. Lecture/lab.

GC 1166. Principles of Chemistry. (3 cr; QP-0621 or equiv; SP-0713 or 0721 or equiv; BC)

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; SP-BC)

Development of common land features (valleys, mountains, rivers, lakes) and processes responsible for their origin and change. Types of surface materials. Movements inside Earth and their effects on its surface. Lab: mineral and rock analysis, topographic map reading, landform identification, landscape interpretation. (3 lect, 4 lab hrs per wk)

GC 1172. Historical Geology. (4 cr; SP-BC)

Development of earth's physical and chemical features through time, with changing patterns of life as a response. Problem-solving, logical deductions from facts stressed. Lab: identification and interpretation of rocks, fossils, geologic maps, ancient environments, and geographies. (3 lect, 4 lab hrs per wk)

GC 1173. Geology of the National Parks. (4 cr; SP-BC)

Processes that produced scenic and geologic features of North America's national parks and monuments, using a regional approach. Role of national park system in modern society. Basic geology introduced as needed. Map analyses emphasized. Lecture and lab integrated.

GC 1211. People and Problems. (4 cr; SP-BC)

Explore social problems that arise in our diverse society. Sociology is the chief, but not exclusive, source of concepts and theories used to analyze problems such as unemployment, social inequality, violence, and the environmental crisis (15 hours in community involvement/service).

GC 1221. Minnesota History. (4 cr; SP-TC)

Minnesota geography, resources, exploration, settlement, ethnicity, economics, and politics related to the Upper Midwest, the nation, and Canada. Researching and writing family or local history as part of the larger history of this region and nation.

GC 1231W. U.S. Growth of National Power. (4 cr; SP-BC)

Political, technological, economic, and social aspects of the growth of national power in the United States and its impact on people in North America and abroad—from the Colonial Era to present.

GC 1233. U.S. Government and Politics. (4 cr; SP-BC)

Structure and process. How government institutions address the demands made on them are examined in the following topics: history and 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; SP-BC)

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; SP-BC)

Political, economic, social, diplomatic, and intellectual aspects of major world cultures. Awareness of growing interdependence of peoples and international perspective on events that affect students' lives. Classroom simulations, lecture, and discussion.

GC 1280. Psychology and Everyday Life. (3 cr; SP-BC)

Using psychological research and theory for effective living. Establishing positive relationships, managing stress, maintaining physical and mental health, leadership, gender roles, and work roles. Readings, writing assignments, and class discussion. Development of appropriate study strategies for social science courses.

GC 1281. General Psychology. (4 cr; SP-BC)

Individual instruction and computer technology help students develop as independent learners as they survey major psychological theories, concepts, and methods. Satisfies introductory psychology requirement for degree programs in management, education, and agricultural marketing and serves as prerequisite for advanced psychology courses.

GC 1285. Introduction to Cultural Anthropology. (4 cr; SP-BC)

Human culture viewed as integrated system of learned and shared knowledge that guides behavior of all members of a given society. Anthropological perspective examines generalizations about existence of cultural diversity by analyzing and comparing the human condition in many contemporary cultures.

GC 1294. Economics in Contemporary Society. (4 cr; SP-BC)

Provides students with basic knowledge of economic concepts used to understand current events and government policies. Supply and demand, GDP, federal budget, fiscal and monetary policies, taxation, poverty, inflation, economic growth, unemployment, and international trade.

GC 1311. Art: General Art. (3 cr; SP-\$3311; BC)

Visual and performing arts produced in diverse American and international cultures. Slides, videos, galleries, performances, and music help students discover how and why art is created. Various artworks discussed to help students formulate and evaluate ideas and attitudes about art.

GC 1312. Identity, Community, and Culture:

Connections in the Arts and Humanities. (4 cr; SP-BC; A-F only)

Interdisciplinary, team-taught course explores how multicultural arts and literature deal with themes of identity and community. Lectures, discussions, interactive exercises, and audiovisual presentations. Students practice one of the arts in lab. Informal and critical writing.

GC 1331. Musical Heritage. (3 cr; SP-TC)

Examines music concepts that may vary when dealing with the musical heritage of different cultures. African, Asian, European, North American, and South American music. Indigenous musical cultures and their values in the United States.

GC 1364. Literature of the American Immigrant Experience. (3 cr; SP-BC)

Literature by and about immigrants explores historical and 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; SP-BC)

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; SP-BC)

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; SP-BC)

Readings in fiction, poetry, drama, and autobiography from contemporary writing not originating in the United States. The focus will be comparative. Extensive written assignments, both formal and informal, as well as lecture and discussion.

Course Descriptions

GC 1371. Reading Short Stories. (3 cr; SP-BC)

The current short story format from diverse communities within North America, Africa, the Caribbean, and Europe. Emphasis on the written literature inspired by oral "storytelling," storytelling as "theatre," and storytelling as communal endeavor.

GC 1374W. The Movies. (3 cr; SP-BC)

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; SP-BC)

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 and effective expression emphasized through writing and revision.

GC 1422. Writing Laboratory: Communicating in Society. (3 cr; QP-1421 or equiv; SP-\$1423, \$1424; 1421 or equiv; BC)

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; QP-1421 or equiv; SP-\$1422, \$1424; 1421 or equiv, # BC)

Writing description, research, and analysis based on work in community setting, and on readings and 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; QP-1421 or equiv; SP-\$1422, \$1423; 1421 or equiv; BC)

Proficiency in academic writing, reading, research. Multicultural, thematic content. Extensive experience with computers as tools for writing/research.

GC 1454. Statistics. (4 cr; QP-0631 or equiv; SP-C in 0731 or equiv; TC)

Problem solving and decision making through collection, analysis, and interpretation of data. Organization and 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; SP-BC)

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; SP-BC)

Communication, ethics, and citizenship in interpersonal, group, and public contexts as well as understanding communication theory and experience through use of diverse verbal and nonverbal communication patterns and strategies. Individual and group activities including public presentations.

GC 1464. Group Process and Discussion in a Multicultural Society. (3 cr; SP-BC)

Nature of groups, how they form and 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 and nonverbal communication patterns and strategies.

GC 1481. Creativity Art Laboratory: Experiences in the Media. (3 cr; SP-BC)

Learn about art by discussing, reading, writing about, and creating it. Explore artistic thinking by making art that reflects personal and cultural identity. Multicultural art works explored through slides and videos. Develop critical skills to analyze, interpret, and evaluate artwork.

GC 1483. Music Laboratory. (3 cr; SP-BC)

Students read, write, perform, and compose music. Fundamentals of music literacy, including note names, rhythmic and metric symbols, key signatures, scales, musical textures, formal structure, and basic harmony. Open to students with or without music training.

GC 1485. Creativity: Photography. (4 cr; SP-Must have camera [35 mm w/adjustable controls preferred]; UC only; BC)

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; SP-BC)

Role of business in the economic and social life of the nation, referencing the symbiotic relationship between business activity and the broader aspects of society. Environmentalism, consumerism, cultural diversity, economic systems, ethics, management, marketing, accounting and finance, and legal issues.

BC—Base Curriculum
TC—Transition Curriculum
CE—Commanding English

GC 1513. Principles of Small Business Operations. (3 cr; SP-TC)

Fundamentals of starting up, purchasing, owning, and operating a small business. Researching business opportunities, assessing competition, seeking financing, organizing and planning internal matters, and developing operating strategies.

GC 1534. Practical Law. (4 cr; SP-TC)

American legal process covering common everyday legal matters including courts, crimes, personal injury, contracts, consumer transactions, property ownership and insurance, debtor-creditor relations, banking, bankruptcy, and international law.

GC 1540. Accounting Fundamentals 1. (3 cr; SP-TC)

Students learn to "keep books". Make accounting entries from business transactions in journals, post to ledger accounts, complete the accounting cycle, and prepare and interpret financial statements.

GC 1571. Introduction to Microcomputer Applications. (4 cr; QP-0621 or equiv; SP-\$1573, \$1574; 0713 or 0717 or 0721 or 0722 or equiv; BC)

Hands-on word processing, data manipulation, data analysis. Word processing: enter, edit, format text. Spreadsheets: enter data, do calculations, make decisions based on data. Database management: manipulate/filter sets of data.

GC 1573. Introduction to Word Processing. (2 cr; QP-0621 or equiv; SP-\$1571; 0713 or 0721 or equiv; BC)

Hands-on word processing using Microsoft Word. Enter, edit, and format text (paragraphs/sections, styles, headers/footers, footnotes, tables). Work with files. Homework assignments/exams done on computer.

GC 1574. Introduction to Spreadsheets. (2 cr; QP-0621 or equiv; SP-\$1571; [0713 or 0721 or equiv], BC)

Hands-on, computer intensive introduction to spreadsheets (Excel). Enter, edit, format text/numbers. Formulas/functions. IF/THEN/ELSE decision logic. Charts. Filtering databases. Homework/exams done on computer.

GC 1575. Introduction to Computers and the Internet. (4 cr; QP-0621 or equiv; SP-0713 or 0721 or equiv; BC)

Hands-on training in computer literacy. Hardware (microprocessor, memory, storage), software (operating systems/applications), Internet (Web, e-mail, Telnet, FTP), multimedia.

GC 1721. Marriage, Family, and Personal Fulfillment. (4 cr; SP-TC)

Psychological, social, and biological aspects of marriage and family living. Helping students gain understanding of, and self-awareness concerning, such areas as dating, mate selection, getting married, having children, and sexuality. Adjustments outside of traditional marriage and family.

GC 1814. American Indian Law. (3 cr; SP-TC)

Federal Indian law. History of native legal issues from pre-European contact to present times in conjunction with applicable cultural norms practiced by various tribes.

GC 1816. African-American Literature. (3 cr; SP-BC)

Short stories, novels, poetry, and drama by African American writers evaluated in the 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; SP-BC)

Historical/contemporary prose, poetry, and drama analyzed to assess artists' interpretations of their identity. Issues of generational conflict/peer pressure.

GC 1851. Multicultural Relations. (3 cr; SP-BC)

Nature of historical and contemporary multicultural relationships within American society. Intercultural, interethnic, interracial, and cross-gender relationships from historical and contemporary perspectives. Develop tools to think about complex issues faced as diverse human beings.

GC 1901. Freshman Seminar: Environmental Issues. (3 cr; SP-\$1902, \$1903, \$1904; BC, fewer than 24 cr)

Reading, discussion, critical analysis, and writing about environmental issues. Intensive, small-group setting.

GC 1902. Freshman Seminar: Cultural Diversity. (3 cr; SP-\$1901, \$1903, \$1904; BC, fewer 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; SP-\$1901, \$1902, \$1904; BC, fewer 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; SP-\$1901, \$1902, \$1903; BC, fewer than 24 cr)

Reading, discussion, critical analysis, and writing about international perspectives. Intensive, small-group setting.

GC 1906W. Freshman Seminar: Environmental Issues. (3 cr; SP-\$1907, \$1908, \$1909; fewer than 24 sem cr; BC)

Reading, discussion, critical analysis, and writing about environmental issues. Intensive, small-group setting.

GC 1907W. Freshman Seminar: Cultural Diversity. (3 cr; SP-\$1906, \$1908, \$1909; fewer than 24 sem cr; BC)

Reading, discussion, critical analysis, and writing about cultural diversity. Intensive, small group setting.

GC 1908W. Freshman Seminar: Citizenship and Public Ethics. (3 cr; SP-\$1906, \$1907, \$1909; fewer than 24 sem cr; BC)

Reading, discussion, critical analysis, and writing about citizenship and public ethics. Intensive, small group setting.

GC 1909W. Freshman Seminar: International Perspectives. (3 cr; SP-\$1906, \$1907, \$1908; fewer than 24 sem cr; BC)

Reading, discussion, critical analysis, and writing about international perspectives. Intensive, small group setting.

GC 1990. Special Topics. (1-8 cr; SP-#, □; TC)

Various topics related to instructor's areas of expertise.

GC 1993. Directed Study. (1-8 cr; SP-#, □; TC)

Student initiated project in consultation with faculty monitor. Student determines what they want to learn, sets goals, designs a course of study, and finds an appropriate faculty member to work collaboratively with them.

GC 1996. Internship. (1-8 cr; SP-#, □; TC)

Teaching internships to teach skills, techniques, and research in disciplinary content associated with college teaching. Community internships teach goals and functions of public/community agencies and exploration of career goals. Internships supervised by faculty monitor and site supervisor.

GC 2283W. Psychology of Human Development. (4 cr; QP-1281 or Psy 1001; SP-\$1283; [1281 or Psy 1001], [1421 or EngC 1011], TC)

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; QP-[1422 or equiv], 20 cr; SP-\$1357; [1421 or equiv], 12 cr, TC)

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; QP-[1422 or equiv], 15 cr; SP-\$1375; 12 cr, #, TC)

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, Cell Biology, and Development

College of Biological Sciences

GCD 3022. Genetics. (3 cr; QP-\$Biol 5003; Biol 1009 or 1202; not for biology majors; SP-\$Biol 4003; 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; QP-3022 or Biol 5003 or BioC 4332; SP-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; QP-Biol 5004; SP-Biol 4004 or #)

Experimental approaches to cell structure, function, and replication. Microscopy, autoradiography, cell fractionation, molecular/chemical analyses.

GCD 4111. Histology: Cell and Tissue Organization. (4 cr; QP-Biol 5004 or #; SP-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; QP-Biol 3011 or Biol 3111 or BioC 3021 or BioC 5331 or #; SP-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; QP-3022 or Biol 5003 or #; SP-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; QP-Biol 5003; SP-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; QP-[Biol 3011 or 3111], Biol 5004; SP-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]; QP-#, Δ; no more than 10 cr of [5970, 5990] may count toward major; SP-#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major; S-N only)

Individual study on selected topics or problems.

Emphasizes selected readings, use of scientific literature. Writing intensive.

GCD 4794W. Directed Research: Writing Intensive.

(1-7 cr [max 15 cr]; QP-#, Δ; no more than 10 cr of [5970, 5990] may count toward major; SP-#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major; S-N only)

Laboratory or field investigation of selected areas of research. Writing intensive.

GCD 4993. Directed Studies. (1-7 cr [max 7 cr]; QP-#, Δ; 10 cr max of 5970 or 5990 may count toward major;

SP-#, Δ; 7 cr max of 4993 and/or 4994 may count toward major; S-N only)

Individual study on selected topics or problems with emphasis on selected readings and use of scientific literature.

GCD 4994. Directed Research. (1-7 cr [max 7 cr]; QP-#, Δ; 10 cr max of 5970 or 5990 may count toward major;

SP-#, Δ; 7 cr max of 4993 and/or 4994 may count toward major; S-N only)

Laboratory or field investigation of selected areas of research.

GCD 5034. Intermediate Molecular Genetics. (3 cr; QP-Biol 5003, Biol 5004; SP-Biol 4003, Biol 4004)

Molecular genetics of prokaryotes and eukaryotes concentrating on characterization and regulation of expression of genes, and techniques used to study gene expression. For advanced bioscience undergraduates and for graduate students not majoring in molecular genetics.

GCD 5036. Intermediate Cell Biology. (3 cr; QP-Biol 5004 or #; SP-Biol 4004 or #)

Current literature in cell biology with overview of discussed topics. Selected scientific papers illustrate new concepts in, and experimental approaches to cell organization and function. Topics vary but include membranes, secretion, endocytosis, the cytoskeleton, and the nucleus.

Geographic Information Science (GIS)

Department of Geography

College of Liberal Arts

GIS 5571. Introduction to Arc/Info. (3 cr; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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. (3 cr; SP-Geog 5561 or equiv, 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]; SP-#)

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; SP-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; SP-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. The Atmosphere. (3 cr; SP-\$Soil 1425)

A pre-calculus introduction to the nature of the atmosphere and its behavior. Topics include atmospheric composition, structure, stability, and motion; precipitation processes, air masses, fronts, cyclones and anticyclones; general weather patterns; meteorological instruments and observation; weather map analysis; weather forecasting.

Geog 1426W. The Atmosphere Laboratory. (1 cr)

Lab offered in conjunction with 1425. Topics include weather observation; meteorological instrumentation; statistical analysis of weather observations and climatological data; map analysis and weather forecasting.

Course Descriptions

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 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; SP-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; SP-\$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; SP-\$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 3158. Southern Africa Development. (3 cr; SP-Soph or Jr or Sr; A-F only)

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; SP-\$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; SP-\$5211, SEAS 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; SP-\$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. (3 cr; SP-Honors)

Character, distribution, development of cities in present-day world. Internal/external locational relationships.

Geog 3371W. Introduction to Urban Geography. (3 cr)

Character, distribution, and development of cities in present-day world. Internal and 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; SP-\$3374W, \$5374; 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; SP-\$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; SP-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. Environmental Development in the Third World. (3 cr; SP-Soph or Jr or Sr; A-F only)

Basic concepts for analyzing relations between capitalist development and environment in Third World. Basic 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; SP-Honors; A-F only)

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; SP-\$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. Introduction to Plant and Animal Geography. (3 cr)

World distributions of plants and animals; biological and ecological background; the geographical picture; the paleoecological record.

Geog 3511. Principles of Cartography. (4 cr; SP-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. (3 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; SP-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; SP-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. (3 cr; SP\$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. (3 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; SP-1301 or Soc 1001 or equiv in other social sciences or humanities or #; SEAS 3482, \$Soc 3671; A-F only)
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; SP-\$1973)
Social/physical characteristics of Twin Cities. Their place in U.S. urban network.

Geog 3985V. Honors Senior Project Seminar. (4 cr; SP-Honors, #)
Completion of research/writing of senior project.

Geog 3985W. Senior Project Seminar. (4 cr; SP-[Jr or sr], #)
Complete the research/writing of senior project.

Geog 3992. Directed Reading. (1-8 cr [max 12 cr]; SP-#, Δ, □)
Guided individual reading.

Geog 3992H. Honors: Directed Reading. (1-8 cr [max 12 cr]; SP-Honors, #, Δ, □)
Guided individual reading.

Geog 3993. Directed Studies. (1-8 cr [max 12 cr]; SP-#, Δ, □)
Guided individual study.

Geog 3993H. Honors: Directed Studies. (1-8 cr [max 12 cr]; SP-Honors, #, Δ, □)
Guided individual study.

Geog 3994. Directed Research. (1-8 cr [max 12 cr]; SP-#, Δ, □)
Individual guided research.

Geog 3994H. Honors: Directed Research. (1-8 cr [max 12 cr]; SP-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; SP-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; SP-\$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; SP-\$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; SP-\$3211, SEAS 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; SP-\$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; SP-\$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; SP-\$PA 5202; A-F only)
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; SP-\$3374; 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. Political Economy of Development. (3 cr; SP-Sr or grad or #)
Nature and scope of the modern world system (capitalism) and its impact on regional development processes; roles of the state and international financial institutions.

Geog 5393. The Rural Landscape. (3 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; SP-\$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 diseases; 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; SP-\$Soil 5401; 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; SP-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; SP-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 5441. Quaternary Landscape Evolution. (3 cr; SP-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; SP-\$ WRS 5101; 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; SP-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; SP-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]; SP-#; S-N only)
Provides intensive hands-on experience in contemporary map production and design, ranging from GIS applications to digital prepress. Strong computer skills essential.

Geog 5561. Principles of Geographic Information Science. (4 cr; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-\$3605W; 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; SP-\$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; SP-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; SP-Jr or sr or grad, \$Arch 5724; A-F only) 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; SP-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]; SP-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; QP-IT student) 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; QP-IT student, AEM 3016; SP-IT student, AEM 3031; A-F only) 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; QP-Upper div IT or grad student, CE 3300; SP-IT student, AEM 3031; A-F only) 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; QP-Sr or #, IT student or grad IT major; SP-CE, GeoE, or Geo upper division or graduate student or #; A-F only) 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; QP-Upper division IT or grad; SP-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; QP-CE or GeoE upper div, 3020, Math 3251, Math 3252; SP-CE or GeoE upper div, 3101, Math 2243, Math 2263; A-F only) 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; QP-Upper division IT or grad student, CE 3300; SP-Upper division student in IT, 3301, CE 3301, or #; A-F only) 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; QP-IT or grad IT major, 5302 or #; SP-Upper division or grad student in IT, 3311, CE 3311, or #; A-F only) 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; QP-Stat 3091 or #, Upper div or Grad student; SP-GeoE, CE, or Geo upper division or grad student, Stat 3021 or #; A-F only) 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; QP-IT or grad student, 3400 or #; SP-IT upper division or grad student; CE 3502 or #; A-F only) 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; QP-IT or grad student, 5425, or #; SP-Upper division or grad student in IT, 4351, CE 4351, or #; A-F only) 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; QP-IT upper div or grad student, 5603; SP-IT upper division or grad student; 4301, CE 4301, or #; A-F only) 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; QP-CE 3300, CE 5301; SP-IT upper division or grad student; 4301, CE 4301 or #; A-F only) 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; QP-CE 5301; SP-IT upper division or grad student, 4301 or CE 4301; A-F only) Soil and rock response in triaxial testing; drained and undrained behavior; elastic and plastic properties. Modeling stresses, strains, and failure in geomechanics problems.

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 1008. Faces of the Earth. (3 cr)

History of pre-17th century ideas of geology in China, Middle East and Europe. Evolution of modern geology from travelers' tales, cosmology, mapmaking, minerals, volcanoes, and earthquakes. Plate tectonic hypothesis and current explanations of geological phenomena. Relations between humans and nature.

Geo 1009. Global Environmental Changes: Earth Systems Science. (4 cr)

Solid Earth, hydrosphere, atmosphere, and biosphere and their interconnections in some natural cycles of material and energy. Consequences of the natural cycles for land-water-atmosphere-life environments and Earth's habitability. Extent of human impact on natural cycles and evidence for global environmental changes.

Geo 1011. Volcanoes of the Earth. (3 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; QP-§Ast 1019, §EEB 1019; SP-§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 1102. Introduction to Earth History. (3 cr; QP-§1002; SP-§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 2111H. Honors: Earth Science. (4 cr; QP-§1001, IT Honors Curr or IT Honors Office consent; SP-§1001, IT Honors Curr or IT Honors Office consent; A-F only)

Application of physics and chemistry to the structure and dynamics of the Earth.

Geo 2201. Geodynamics I: The Solid Earth. (3 cr; QP-Phys 1251, Phys 1252; SP-Phys 1301)

Dynamics of the solid Earth, particularly the tectonic system. Seismology, internal structure of the Earth, Earth's gravity and magnetic fields, paleomagnetism, global plate tectonics, and tectonic systems; field trip.

Geo 2301. Mineralogy. (3 cr; QP-1001, Chem 1051, Math 1252 or #; SP-Chem 1021, Math 1271 or #)

Crystallography, crystal chemistry and physics. Physical and chemical properties, crystal structures and chemical equilibria of the major mineral groups. Lab includes crystallographic, polarizing microscope, X-ray powder diffraction exercises, hand-specimen mineral identification.

Geo 2302. Petrology. (3 cr; QP-3401 or #; SP-2301 or #)

Magmatic and metamorphic processes, with an emphasis on plate tectonic interpretation of rock sequences.

Geo 2303W. Geochemical Principles. (3 cr; QP-Chem 1051, Chem 1052; SP-Chem 1021, Chem 1022, Math 1271)

Origin of the elements (nucleosynthesis, elemental abundances), geochemical classifications, isotopes (radioactive and stable), phase equilibria, and models of Earth's geochemical evolution. Basic geochemical processes that produced Earth's lithosphere, hydrosphere, and 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]; QP-#, A; SP-#)

Geological or geophysical problems studied independently under the direction of a faculty member.

Geo 3202. Geodynamics II: The Fluid Earth. (3 cr; QP-3201; SP-2201)

Dynamics of the fluid Earth, mainly surface processes and convection.

Geo 3401. Geochronology and Earth History. (3 cr; QP-3301; SP-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];

QP-Geo or Geophys or GeoEng major or #; SP-Geo or Geophys or GeoEng major or #)

Modeling of geologic or geophysical systems.

Geo 3880. Laboratory Workshop. (1 cr [max 2 cr];

QP-Geo or Geophys or GeoEng major or #; SP-Geo or Geophys or GeoEng major or #)

Geologic or geophysical lab study.

Geo 3890. Field Workshop. (1 cr [max 2 cr]; QP-Geo or

Geophys or GeoEng major or #; SP-Geo or Geophys or GeoEng major or #)

Geologic or geophysical field study.

Geo 3911. Introductory Field Geology. (4 cr; QP-3202, #; SP-3202, #; A-F only)

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]; QP-#, SP-#)

Topics in geology and geophysics investigated in a seminar format.

Geo 4093. Problems in Geology and Geophysics:

Senior. (1-4 cr [max 6 cr]; QP-#, A; SP-#)

Nonstructured research course enabling seniors to engage in independent research under faculty supervision.

Geo 4094. Senior Thesis. (2 cr [max 4 cr]; QP-Sr, Geo or

GeoPhys major, #; SP-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;

QP-Phys 1253; SP-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;

QP-3201, Phys 1251, Math 1251 or #; SP-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; QP-3201, Phys 1253; SP-2201, Phys 1302; A-F only)

Basic elasticity, basic seismology, and physical structure of the Earth's crust and deep interior.

Geo 4212. Solid Earth Geophysics II. (3 cr; QP-3201, Phys 1253; SP-2201, Phys 1302; A-F only)

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; QP-Phys 1251;

SP-§Phys 4221, 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;

QP-3402, Chem 5501, Math 3261 or #; SP-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; QP-3402, 5101 or #; SP-2302, 3401 or #)

Fundamental concepts related to deformation of Earth's crust; processes associated with deformation, faulting, folding, and fabric development; labs and recitations include solving problems and conducting physical and numerical experiments. Field trips.

Geo 4502. Tectonic Styles. (3 cr; QP-5201 or #; SP-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; QP-5201 or #; SP-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; QP-§EEB 5601, Chem 1052 or #; SP-§EEB 4601, Chem 1022 or #; A-F only)

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;

QP-3402; open only to IT upper div majors in geology, geophysics, geo-engineering, mining engineering or CLA jr or sr majors in geology or #; SP-2301, 2302 or #)

Interpretation of the origin of sedimentary rocks through application of basic physical and chemical principles, understanding of modern depositional environments, petrographic microscopy, basin dynamics, and stratigraphy.

Course Descriptions

Geo 4605. Limnology Laboratory. (1 cr; QP-SEEB 5621, 5601 or EEB 5601 or #: SP-SEEB 4605, 4601 or EEB 4601 or #: A-F only)

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 4631. Earth Systems: Geosphere / Biosphere Interactions. (3-4 cr; QP-SEEB 5004, 3202, 3301 or #: SP-SEEB 4631, 2303, 3202, or #)

Interdisciplinary study of global-change forcing mechanisms, feedbacks and dynamics on various time scales, using paleorecord to illustrate processes.

Geo 4701. Geomorphology. (3-4 cr; QP-1001, Math 1031 or #: SP-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; QP-1002 or #: SP-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; QP-3111, #: SP-3911, #: A-F only)

Geologic mapping; study of igneous, metamorphic, and sedimentary rocks; structures and surficial features; problem solving. Paper required.

Geo 4921. Field Geophysics. (4 cr; QP-3111 or #: SP-3911 or #: A-F only)

Gravity, magnetics, seismic refraction and reflection, electrical resistivity and electromagnetic methods. Attention to near-surface and upper-crustal problems, concentrating on proper field design and methods. Interpretational methods include preliminary "rule of thumb" methods as well as quantitative computer modeling.

Geo 4971. Field Hydrogeology. (4 cr; QP-5641, #: SP-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. (4 cr; QP-§1001; [one qtr chem or physics], educ degree; SP-§1001; 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; QP-§1002, ed degree; SP-§1002, 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; QP-§1003, ed degree; SP-§1003, 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; QP-§1601, ed degree; SP-§1006, 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; QP-Geo core courses through 5201 or equiv or #: SP-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; QP-Math 3221 or #: SP-Math 2263 or #: A-F only)

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; QP-Math 3261 or #: SP-Math 2263 or #: A-F only)

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; QP-3201, Phys 1253; SP-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; QP-Chem 5501 or #: SP-Chem 3501 or #)

General principles of solution chemistry applied to geology. Solution-mineral equilibrium. Redox processes in natural waters. Geochemistry of hydrothermal fluids. Environmental geochemistry.

Geo 5302. Isotope Geology. (3 cr; QP-3301 or #: SP-2303 or #: A-F only)

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; QP-3401, one yr chem and physics or #: SP-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; QP-5201 or #: SP-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; QP-5653 or #: SP-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; QP-5651, Math 3261 or #: SP-4602, Math 2243 or #)

Elementary mechanics of sediment transport applied to quantitative interpretation of sedimentary rocks.

Geo 5701. General Hydrogeology. (4 cr; QP-1001, Chem 1052, Math 1252, Phys 1105, Geo majors-core curriculum through 3402 or #: SP-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; QP-5643 or #: SP-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]; QP-5201 or #: SP-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; QP-Math 3261 or #: SP-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; QP-5601 or EEB 5601; SP-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; QP-5641, #: SP-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; QP-CSci 3101 or CSci 3102 or CSci 3113 or #: SP-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. (4 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. (4 cr; SP-1001)

Listening, reading, speaking, writing. Emphasizes proficiency. Topics include free-time activities, careers, and culture of German-speaking areas.

Ger 1003. Intermediate German. (4 cr; SP-1002 or Entrance Proficiency Test)

Listening, reading, speaking, writing. Contextualized grammar/vocabulary. Authentic readings. Essay assignments.

Ger 1004. Intermediate German. (4 cr; SP-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]; SP-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. (4 cr; SP-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. (4 cr; SP-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]; SP-1003 or equiv) Consolidating/developing reading/writing skills.

Ger 3011W. Conversation and Composition. (4 cr; SP—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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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 3104W. Reading and Analysis of German Literature. (4 cr; SP-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]; SP-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; SP-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; SP-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; SP-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]; SP-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]; SP-3104) Intensive exploration of specific authors, literary genres, or other literary topics not covered in period courses.

Ger 3501. Contemporary Germany. (3 cr; SP-¶3012) Social, political, and cultural developments in Germany from 1945 to the present.

Ger 3510. Topics in German Studies. (3 cr [max 9 cr]; SP-¶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]; SP-¶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; SP-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]; SP-3012, Δ) Preparation for research abroad during semester before departure. Written and oral reports upon return.

Ger 3601. German Medieval Literature. (3 cr; SP—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]; SP—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; SP—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; SP—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; SP—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; SP—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; SP-1004) Change in grammar and lexicon, 750 A.D. to present.

Ger 3702. Beginning Middle High German. (3 cr; SP-1004) Middle High German grammar. Selected literary texts.

Ger 3703. Introduction to Old High and Low German. (3 cr; SP-3702 or #) Biographies, charms, heroic poetry, and miscellany from the 9th and 10th centuries.

Ger 3704. German Dialects. (3 cr; SP-1004) Contemporary regional dialects recorded on tape and written in texts. Synchronic and diachronic analysis.

Ger 3705. Characteristics of the Germanic Languages. (3 cr; SP-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]; SP-#, Δ, □) Guided individual reading or study.

Ger 4040. German Play: Oral Interpretation and Performance of German. (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; SP-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).

Course Descriptions

Ger 4622. German Cinema Since 1945. (3 cr; SP-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; SP-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; SP-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; SP-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]; SP-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]; SP-3104 or equiv)

A single topic of contemporary German culture explored in depth.

Ger 5610. German Literature in Translation. (3 cr [max 9 cr]; SP-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]; SP-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; SP-13012)

Historical development of German from the beginnings to 1450.

Ger 5712. History of the German Language II. (3 cr; SP-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; SP-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; SP-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; SP-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]; SP-#, A, □)

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; SP-Honors; A-F only)

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.

Global Studies (GloS)

Institute of International Studies

College of Liberal Arts

GloS 1015V. Honors: Introduction to Global History Since 1950. (4 cr)

Global History in Information Age. East-West divisions during the 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 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 1201. Exploring Global Studies. (1 cr [max 1 cr]; SP-A; S-N only)

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; SP-Fr or max 36 cr; A-F only)

Topics specified in *Class Schedule*.

GloS 3003. Cultural Anthropology. (3 cr; SP-\$Anth 3003; 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. International Relations: Practice and Theory. (4 cr; SP-\$3101H; A-F only)

Theoretical approaches, contextually grounded case studies, simulations of significant contemporary world problems.

GloS 3101H. Honors International Relations: Practice and Theory. (4 cr; A-F only)

Core course for international relations majors. Provides a broad range of theoretical approaches, contextually grounded case studies, and simulations of significant contemporary world problems. Students acquire insights and skills needed to become a professional in the field.

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; SP-[3101, Area 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. Introduction to Area Studies. (4 cr)

Approaches to relationships between local experience, global issues. Gender relations as point of entry into themes such as identity, livelihood, immigration, family. Case studies from three regions of the world.

GloS 3301. Environment and Empire. (3 cr; SP-[3101, Area 3144] or #; A-F only)

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; SP-\$5302; [3101, 3144] or #; A-F only)

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; SP-[3101, 3144] or #; A-F only)

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; SP-[3101, 3144] or #; A-F only)

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 3550H. Honors Course: Supervised Research Paper. (4 cr)
Supervised research paper.

GloS 3552H. Honors Seminar: Making of the Modern World. (3 cr; SP–MacArthur Program or [IntR, honors]; A-F only)
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; SP–#; A-F only)
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 3558. Honors: Junior Research Seminar. (3 cr; SP–Jr, honors, IntR; A-F only)
Theoretical perspectives/methods available to researchers in international studies.

GloS 3602. Other Worlds: Globalization and Culture. (3 cr; SP–[3101, Area 3144] or #; A-F only)
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 3620. Foreign Language News Coverage of International Events. (1 cr; SP–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 3900. Topics in International Relations. (3 cr)
Selected issues and topics in international relations. Topics will vary every semester. Topics specified in *Class Schedule*.

GloS 3910. Topics in East Asian Studies. (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; SP–\$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]; QP–#, Δ, □; SP–#, Δ, □)
Guided individual reading or study.

GloS 4504W. Senior Project. (3 cr; QP–Sr or #; SP–Sr or #)
Research methods, writing skills, and bibliography related to field of study.

GloS 4601. International Development: Theory and Practice. (4 cr; SP–Δ; A-F only)
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 4603. Work, Family, Community, and Development in Cross-Cultural Perspective. (4 cr; SP–□; A-F only)
Intercultural communication concepts/skills. US 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; SP–[3101, Area 3144, global studies major] or #; A-F only)
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; SP–[3101, Area 3144, honors student, Global Studies major] or #; A-F only)
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; SP–Jr or sr or grad or #)
Topics vary. See *Class Schedule*.

GloS 5103. Colonialism and Modernity. (3 cr; SP–[3101, Area 3144] or #; A-F only)
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; SP–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; SP–[3101, Area 3144] or #; A-F only)
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; SP–[3101, Area 3144, grad student] or #; A-F only)
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 5900. Topics in International Relations. (3 cr)
Proseminar. Selected issues in international relations. Topics vary every semester.

GloS 5910. Topics in East Asian Studies. (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]; QP–#, Δ, □; SP–#, 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]; QP–#, Δ, □; SP–#, 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. (4 cr)
Introduction to classical Greek.

Grk 1002. Beginning Classical Greek II. (4 cr; SP–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; SP–\$1001; ¶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; SP–\$1002; ¶1111, [honors or high ability as indicated by high school transcript])
Drills, composition exercises.

Grk 3111. Intensive Classical Greek. (3 cr; SP–\$1001–1002, \$1111, ¶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; SP–\$1001–1002, \$1112, ¶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; SP–1002 or 1111 or 3111 or 3 yrs high school Greek or Δ)
Selections from classical Attic authors.

Grk 3114. Ionic Authors. (4 cr; SP–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]; SP–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]; SP–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]; SP–3114 or 3 years HS Greek or Δ)
Advanced reading in Greek tragedy.

Grk 3330. Advanced Undergraduate Greek: Comedy. (3 cr [max 9 cr]; SP–3114 or 3 years HS Greek or Δ)
Advanced readings in Greek comedy.

Grk 3340. Advanced Undergraduate Greek: History. (3 cr [max 9 cr]; SP–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]; SP–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.

Course Descriptions

Grk 3360. Advanced Undergraduate Greek: Religious Texts. (3 cr [max 9 cr]; SP-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]; SP-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]; SP-3114 or 3 years HS Greek or Δ) Selections from Greek lyric poets.

Grk 3390. Advanced Undergraduate Greek: Romance. (3 cr [max 9 cr]; SP-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]; SP-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]; SP-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; SP-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]; SP-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; SP-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; SP-Greek 3114) Theory and practice. Elements of palaeography 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; SP-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 Palaeography. (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; SP-# 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; SP-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]; SP-#, Δ, □) Guided individual reading or study.

Grk 5994. Directed Research. (1-12 cr [max 18 cr]; SP-#, Δ, □) Supervised original research on topic chosen by student.

Grk 5996. Directed Instruction. (1-12 cr [max 20 cr]; SP-#, Δ, □) Supervised teaching internship.

Hebrew (Hebr)

Department of Classical and Near Eastern Studies College of Liberal Arts

Hebr 1001. Beginning Hebrew I. (4 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. (4 cr; SP-1001 or #) Continuation of 1001. For students whose goal in 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; SP-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; SP-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; SP-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. (4 cr; SP-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. (4 cr; SP-3011 or qualified fr or #) Extensive reading of simplified modern Hebrew prose selections. Discuss poetry, newspaper, film, and TV in Hebrew. Israeli cultural experiences. Home 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; SP-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; SP-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; SP-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; SP-3111 or #) Selections from Mishnah, Gemara, Midrash and codes.

Hebr 3122. Medieval Hebrew Literature I. (3 cr; SP-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; SP-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; SP-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]; SP-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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-#)

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]; SP-#, A)

Historical, linguistic, literary, religious, or humanistic study of Hebrew society and culture. Approach and method of study varies with topic.

Hebr 5992. Directed Readings. (1-4 cr [max 12 cr]; SP-3012 or #)

Guided individual reading or study.

Hindi (Hndi)

Institute of Linguistics and Asian and Slavic 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. (4 cr)

Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Hndi 1102. Beginning Hindi. (4 cr)

Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Hndi 3101. Beginning Hindi. (4 cr)

Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Hndi 3102. Beginning Hindi. (4 cr)

Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Hndi 3131. Intermediate Hindi. (4 cr; SP-1102 or #)

Development of reading, writing, speaking, and listening skills. Grammar review, some basic compositions and oral presentations.

Hndi 3132. Intermediate Hindi. (4 cr; SP-3131 or #)

Development of reading, writing, speaking, and listening skills. Grammar review, some basic compositions and oral presentations.

Hndi 4161. Advanced Hindi. (4 cr; SP-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; SP-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 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; SP-#, A, □)

Hndi 5993. Directed Readings. (3-5 cr; SP-#, A, □)

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; SP-§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; SP-□)

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; SP-§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 1015. Introduction to Global History Since 1950. (4 cr; SP-§1015H, §GloS 1015, §GloS1015H; A-F only)

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 1015H. Introduction to Global History Since 1950. (3 cr; SP-§1015, §GloS 1015, §GloS 1015H;

A-F only)
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; SP-§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; SP-§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 1026. Western Civilization from its Origins to ca 1500. (3 cr; SP-§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; SP-§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; SP-§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; SP-§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; SP-§1302)

Modern America from 1880 to the present.

Hist 1462. Introduction to East Asia in Modern Times 1600-2000. (4 cr)

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.

Hist 1908W. Freshman Seminar. (3 cr; SP-Fr with no more than 24 cr; A-F only)

Topics specified in *Class Schedule*.

Hist 3013. Introduction to World History. (4 cr)

The world today and its recent past. Cold War; expansion of the American and Soviet economic, political, and cultural systems, dominant culture and minority questions; contemporaneous developments in the Third World; global order; movements for peace, ecology, and human rights.

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.

Course Descriptions

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 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 3421. The World and the West 1400-1900. (3 cr; SP—One sem of world history or Western civilization recommended; A-F only)
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 3422. World History in the 20th Century. (4 cr; A-F only)
Analyzes the major events in 20th-century global history in comparative or cross-cultural context. The decline of Western imperialism, the rise of total war and totalitarianism, nationalism and nation-building are among the key topics.

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 post-colonial 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. (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, 1200-2000. (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; SP—\$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; SP—\$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; SP—\$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; SP—\$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 3473. Family, School, and Work in Modern Japanese History. (3 cr; SP—\$5473, \$EAS 3473)
Impact of economic, social, and cultural change on males and females in the family, the education system, and the employment system from the 17th through the 20th centuries.

Hist 3474. The Rise of Modern Japan: 1850s to 1900s. (3 cr; S-N only)
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.

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 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 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 Seljuk Turks. Sunnism re-emerges. Ikhhanids.

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)
Funding of Ottoman society and 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; SP—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 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; SP—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; SP—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. (3-4 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. 20th-Century Germany: The Unmastered Past. (3-4 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, the Hitler 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 3703W. European Cities: 1300-1800. (3 cr; SP—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 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; SP-\$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 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 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.

Course Descriptions

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; Chassidism 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)

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 Revolution, the Constitution, and the Beginnings of American Politics. (3 cr)

The culture and structure of late colonial politics; regionalism and connections between society and politics; the 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: Colonial Era to Civil War. (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 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 Ethnic: 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. (3 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 cr; SP-#)

The United States through its cultural diversity. How Native Americans, African Americans, European Americans, Asian Americans, Hispanic Americans interacted, defined what it meant to be an American in 19th/20th centuries.

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]; SP-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]; SP-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]; SP-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]; SP-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]; SP-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; SP-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]; SP-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 3961W. Major Paper. (4 cr; SP-Δ; A-F only)

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 3980W. Supplemental Writing in History. (1 cr [max 4 cr]; SP-#; must be attached to a 3-credit 3xxx or 5xxx course taken simultaneously; A-F only)

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]; SP-#, A, □: A-F only)

Guided individual reading or study. Open to qualified students for one or more semesters.

Hist 3994. Directed Research. (1-16 cr [max 16 cr]; SP-#, A, □: A-F only)

Qualified students work on a tutorial basis.

Hist 4071. History of Rome to 78 B.C. (3 cr; SP—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; SP—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; SP—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; SP—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 4479. Wall and Market: History of Chinese Cities. (4 cr)

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 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]; SP—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]; SP—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]; SP—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]; SP—Advanced undergrad or grad; A-F only)

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]; SP—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]; SP—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]; SP—Jr or sr or grad or #)

Selected topics in history not covered in regular courses. Taught as staffing permits.

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; SP—#)

Basics of quantitative historical data collection, measurement, and analysis.

Hist 5035. The Germ Theory and Modern Medicine. (3 cr; SP—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; SP—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 5061. 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 5062. 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 5111. Proseminar in the History of Medieval Europe. (3 cr; SP—Advanced undergrads of exceptional ability or grads; #; A-F only)

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; SP—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. (3-4 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 [max 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 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.

Course Descriptions

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 cr [max 4 cr]; SP-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; SP-# 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 5446. Problems in West African History. (3 cr; SP-# 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; SP-\$3464, SEAS 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; SP-\$3465, SEAS 3465)
Examine 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 5467. State and Revolution in Modern China. (3 cr; SP-\$3467, SEAS 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; SP-\$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. Family, School, and Work in Modern Japanese History. (3 cr; SP-\$3473)
Impact of economic, social, and cultural change on males and females in the family, the educational system, the employment system from the 17th century through the 20th centuries.

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 5520. Topics in Chinese History. (3 cr)

Hist 5611. Proseminar in Medieval History. (3 cr; QP-Grad student or #; SP-Grad student or #; A-F only)
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; QP-\$5611, grad student) or #; SP-\$5611, grad student) or #; A-F only)
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 5616. Proseminar in Medieval Spain. (3 cr; SP-#; A-F only)
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. (4 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 5631. Proseminar: Comparative Early Modern History. (3 cr; SP-Hist grad or #; A-F only)
Critical reading of historical literature dealing with integration of the globe during the early modern period, ca. 1350-1750; book reports, class discussion.

Hist 5634. Proseminar in Medieval and Early Modern European Russia. (3 cr; SP-Some coursework in history of medieval and early modern European Russia or #; A-F only)
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 5650. Proseminar: Early Modern Europe. (3 cr; SP-Hist grad or #; A-F only)
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; SP-#; A-F only)
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; SP-#; A-F only)
Critical study of principal writings about English history.

Hist 5671. Proseminar: Modern Britain. (3 cr; SP-#; A-F only)
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]; SP-Grad or #; A-F only)
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; SP-\$3721; 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; SP-#)
Selected themes in modern European women's history including 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]; SP-#; A-F only)
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 the 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; SP—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; SP-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; SP-#)
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; SP-#)
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)
Topics include but not limited to reconstruction, gilded age, the West, progressivism, the Depression, WW2, 1960s-present. Emphasizes social/legal history, race, gender, and immigration.

Hist 5841. Proseminar in American Economic History. (3 cr; SP-#; A-F only)
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; SP-#)

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; SP-#; A-F only)

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; SP-#; A-F only)

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; QP-#; SP-#)

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; SP-#)

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; SP-#)

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; SP-#)

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; SP-#)

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; SP-#)

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]; SP-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; SP-#)

Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes.

Hist 5902. Latin America Proseminar: Modern. (3 cr; SP-#)

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]; SP-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]; SP-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]; SP-Grad or #; A-F only)

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]; SP-Grad student or #; A-F only)

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; SP-Previous coursework in Greek or Roman history, #; A-F only)

Seminar on a selected topic in ancient history.

Hist 5934. Comparative History and Social Theory. (4 cr; A-F only)

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]; SP-#; A-F only)

Possible topics include cultural, economic, intellectual, political, and social history.

Hist 5941. Readings in Chinese Documents. (3 cr; SP-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; SP-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]; SP-Grad or advanced undergrad with #; A-F only)

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]; SP-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)

A research proseminar on the actions of Europeans in the wider world from 1350 to 1790. Based on documents in the James Ford Bell Library.

Hist 5964. Comparative Economic History. (3 cr; SP-#)

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)

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]; SP-#, Δ, □; A-F only)

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]; SP-#, Δ, □; A-F only)

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;

SP-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; SP-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; SP-5210; A-F only)

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; QP-\$3711, \$3712; SP-\$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; QP-\$3713; SP-\$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; QP-\$3811, \$3812; SP-\$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; QP-\$3813; SP-\$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 3211. Biology and Culture in the 19th and 20th Centuries. (3 cr; QP-\$5211; SP-\$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; QP-\$5242; SP-\$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; SP-\$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; QP-\$5331; SP-\$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; QP-\$5332; SP-\$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; SP-\$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; QP-\$1711, \$1712; SP-\$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; QP-\$1713; SP-\$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; QP-\$1811, \$1812; SP-\$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; QP-\$1813; SP-\$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; QP-General physics or #; SP-\$Phys 4111, 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; QP-General physics or #; SP-\$Phys 4121, 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, Eniwetok, 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; SP-\$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; SP-\$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; SP-\$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; SP-\$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; QP-\$3331; SP-\$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; QP-\$3332; SP-\$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; SP-\$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]; QP-#; SP-#)

Guided individual reading or study.

HSci 5994. Directed Research. (1-15 cr [max 15 cr]; QP-#; SP-#)

Honors Colloquia (HCol)

CLA Honors Program

College of Liberal Arts

HCol 1001H. Honors Colloquium: Introduction to the Arts and Sciences. (1 cr; SP-1st term fr, honors; S-N only) Introduction to problems these disciplines address, methods they use. Discussions led by faculty representing various disciplines.

HCol 1010H, 1020H, 1030H, 1040, 1050, 1060. Honors Colloquium. (2 cr [max 12 cr]; QP-[Fr or soph], honors; SP-[Fr or soph], honors) Special topics. Discussions, active learning. Often interdisciplinary in perspective.

HCol 1070, 1080, 1090, 1120, 1130, 1140. Honors Colloquium. (1-3 cr; SP-Fr or soph, honors div regis) Special topics course designed to add breadth and depth to the education of honors students. Discussions and active learning. Often interdisciplinary in perspective.

HCol 1093. Directed Studies. (1-4 cr [max 16 cr]; QP-[Fr or soph], honors, #, Δ, □; SP-[Fr or soph], honors, #, Δ, □) For additional research related to a colloquium topic.

HCol 1110V. Honors Colloquium. (3 cr [max 12 cr]; QP-[Fr or soph], honors; SP-[Fr or soph], honors) Special topics. Discussions, active learning. Often interdisciplinary in perspective.

Honors Seminar (HSem)

CLA Honors Program

College of Liberal Arts

HSem 3010, 3030, 3050. Honors Seminar. (2-4 cr [max 12 cr]; QP-[Jr or sr], honors; SP-[Jr or sr], honors) Special topics. Discussions, active learning. Often interdisciplinary.

HSem 3020, 3040. Honors Seminar. (3-4 cr [max 12 cr]; QP-[Jr or sr], honors; SP-[Jr or sr], honors) Special topics. Discussions, active learning. Often interdisciplinary.

HSem 3060, 3070, 3080, 3130, 3140. Honors Seminar. (1-3 cr; SP-Jr or sr, honors div regis; A-F only) Special topics course designed to add breadth and depth to the education of honors students. Discussions and active learning. Often interdisciplinary in perspective.

HSem 3093. Directed Studies. (1-4 cr [max 16 cr]; QP-[Jr or sr], honors, #, Δ, □; SP-[Jr or sr], honors, #, Δ, □) Additional research related to seminar topic.

HSem 3110, 3120. Honors Seminar. (3 cr [max 12 cr]; SP-Jr or sr, honors div regis; A-F only) Special topics course designed to add breadth and depth to the education of honors students. Discussions and active learning. Often interdisciplinary in perspective.

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; SP-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 1014. Edible Landscaping. (2 cr; QP-1036; SP-1001) Edible plants in the home landscape. Variety of plant materials available and their placement, and the impact of decisions on production. Plant combinations to enhance design and production considerations. Writing and decision cases used.

Hort 3002. Greenhouse Management. (3 cr; QP-1036; SP-1001; A-F only) 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; QP-[1036, 1PBio 3131, [Chem 1051 or equiv]] or #; SP-[1001, 1Biol 3002, 1Biol 3005, [Chem 1021 or equiv]] or #; A-F only) Effects of environment on plant growth/physiology. How horticulturalists manipulate environment to produce high quality plants.

Hort 3018. Landscape Operations. (2 cr; QP-1036 or #; SP-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]; QP-Jr or sr Hort major, #; SP-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; QP-1021, 1022, 1036; SP-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; QP-[1021, 1036] or #; SP-[1001, 1012] or #; A-F only) 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; QP-[1021, 1036] or #; SP-[1001, 1012] or #; A-F only) Production, maintenance, and marketing of woody ornamental plants. Establishment/management of nursery or garden centers. Lab, field trips.

Hort 4051. Floriculture Production and Management I. (4 cr; QP-1036, 1022, 3002, #; SP-1001, 1011, 3002, #) Problem-solving, 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. (4 cr; QP-1036, Soil 3125; SP-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; QP-Chem 1001 or 1051, GCB 3022 or equiv; SP-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; QP-1036 or Biol 1102 or PBio 3012 or equiv, jr or sr or #; SP-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 4092. Special Topics in Horticulture. (1-5 cr [max 15 cr]; QP-Varies with topic; SP-Varies with topic) Topics of public and scientific interest in horticulture. Content varies each semester, inquire at department office before registration. Lab fees may be assessed.

Hort 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; QP-COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; SP-COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; S-N only) 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; QP-Biol 1009 or equiv or grad, #; SP-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; QP-3001; SP-3005) Control of growth and development in sexual and asexual reproduction of plants including effects of environment, plant growth substances and protocols on dormancy, origin and development of adventitious structures, and success with specialized propagation techniques. Lecture/lab.

Hort 5018. Landscape Operations. (3 cr; QP-1036 or #; SP-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 5021. Landscape Design, Implementation, and Management II. (3 cr; QP-5041 or #; SP-4021) Residential, commercial, and recreational sites. Architectural/graphic techniques, plan drawings, sections elevations, perspectives, working drawings. Grading and site manipulation, including surveying, irrigation, and drainage. Development of business/grounds management plans. Landscape estimating/bidding.

Course Descriptions

Hort 5022. Topics in Plant Science for Teachers. (1-4 cr; QP-Biol 1103 or equiv or ed course; no cr for Hort major or grad student; SP-Biol 2012 or equiv or ed course; no cr for Hort major or grad student)

Hort 5023. Public Garden Management. (2 cr; SP-#) Areas of operations (e.g., planning; educational programming; plant conservation/curation; public relations; garden, personnel, and business management). Overview of knowledge/skills necessary for public garden management.

Hort 5024. Landscape Development. (1 cr; SP-5021 or #; A-F only) 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; QP-1036 or #; SP-1001, 3005; A-F only) 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; SP-[3005, Ent 3001, PIPa2001, Soils 2125] or #; A-F only) 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; QP-5046 or #; SP-4041; A-F only) 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 5042. Nursery Operations. (1 cr; QP-[5046, 5047] or #; SP-5041 or #) Hands-on experience in nursery production. Propagating, growing, and harvesting plants. Operating the equipment commonly used in nurseries.

Hort 5051. Floriculture Production and Management II. (4 cr; QP-5054 or #; SP-4051; A-F only) Propagation, production, and utilization of floral crops with emphasis on bedding plants, perennials, and cut flowers. Grow, market, and utilize herbaceous plants. Cultural practices; concepts behind manipulation of environmental factors to achieve desired plant growth and quality. Lab, field trips.

Hort 5061. Turfgrass Science. (3 cr; QP-3072; SP-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; QP-Biol 1103 or 3012; Biol 1201, Biol 5041, Ecol 3001 or equiv or #; SP-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]; QP-8 cr upper div Hort courses, #; SP-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.

Hort 5183. Water, Minerals, and Translocation. (3 cr; QP-Soil 3125 or equiv, PIPH 1xxx or #; SP-Soil 2125 or equiv, PIPH 1xxx or #) Transport processes in plants including water and nutrient absorption and distribution, effects of and adaptations to water and nutrient stress, functions of mineral nutrients, and translocation of photosynthates.

Hort 5990. Special Workshop in Horticulture. (1-4 cr [max 12 cr]; QP-#; SP-#) Workshops on a variety of topics in horticulture offered in locations other than the Twin Cities campus. See *Class Schedule* or department for current offerings.

Human Ecology (HE)

College of Human Ecology

HE 1200V. First-Year Honors Colloquium. (1-2 cr [max 4 cr]; SP-CHE honors; A-F only) 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 1201. Career Exploration and Job/Internship Search. (1 cr; S-N only) Identifying/developing academic/professional goals through career decision making, self assessment, occupational research, job search strategies. Building a career plan using college experience, coursework, internships, community service, campus involvement, work experience, travel, hobbies.

HE 1902. Freshman Seminar: Cultural Diversity. (1-3 cr [max 6 cr]; QP-Fr; SP-Fr; A-F only) Issues related to human ecology disciplines and cultural diversity. Topics announced in advance. Small-group seminar.

HE 1910. Freshman Seminar. (1-3 cr [max 6 cr]; SP-Fr; A-F only) Issues related to human ecology disciplines. Topics announced in advance. Small-group seminar.

HE 1910W. Freshman Seminar. (1-3 cr [max 6 cr]; SP-Fr; A-F only) Issues related to human ecology disciplines. Topics announced in advance. Small-group seminar.

HE 4140. Special Topics in Human Ecology. (1-4 cr [max 12 cr]; QP-Prereq depends on topic; SP-#) In-depth study of a selected topic.

HE 4150. Honors Seminar. (1-3 cr [max 6 cr]; SP-Honors student; CHE students must take A-F) Topics specified in *Class Schedule*.

HE 4150H. Honors Seminar. (1-3 cr [max 6 cr]; SP-Honors; CHE students must take A-F) Topics specified in *Class Schedule*.

HE 4160H. Honors Capstone Project. (1-4 cr [max 4 cr]; QP-#; SP-CHE honors, #; A-F only; 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 5001W. 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; SP-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; SP-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; SP-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; SP-5001 or 5101, 5102, 5103, 5104; A-F only) 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]; SP-5001, 5201 or 5301; S-N only) 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; SP-2 core courses in HRD; A-F only) 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; SP-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. (2 cr; A-F only)

Development of tests of knowledge, effect, and processes for programs focused on instruction of skills associated with business and industry; development of learning progress reporting systems; evaluation of instructional effectiveness.

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; SP-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; SP-BIE 5011 or equiv)

Designing, creating, and presenting information using multimedia resources in business settings.

HRD 5629. Course Development in Business and Industry. (2 cr; A-F only)

Identifying content, stating objectives, sequencing, planning lessons, and selecting methods and media for instruction and evaluation and feedback.

HRD 5661. Instructional Methods in Business and Industry Education. (2 cr)

Exploration of basic strategies and techniques used by instructors in settings ranging from schools and colleges to business and industry.

HRD 5662. Computer Training in School and Industry Settings. (2 cr; SP-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 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. (2 cr; QP-Econ 1101, 1102, Psy 1001; SP-Econ 1101, 1102, Psy 1001)

Role of human resource management in organizations. Labor markets, recruitment, selection, training, compensation, labor relations, and performance management. The evolving nature 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; SP-[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; SP-[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; SP-[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 3121. Human Resource Management and Industrial Relations. (2 cr; QP-CSOM business minor; SP-CSOM business minor)

Role of human resource management in organizations. Labor markets, recruitment, selection, training, compensation, labor relations, performance management. Evolution of work, discrimination in employment, work performance/reward, effects of changing technology. Adapted for CSOM minor program.

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; SP-[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; SP-[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; SP-[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; QP-SP-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 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]; QP-MAHRIR office approval; SP-MAHRIR office approval)

Individual readings or research topics in human resources and industrial relations.

Humanities (Hum)

Department of Humanities

College of Liberal Arts

Hum 1001. Humanities in the West I. (4 cr; SP-\$3001)

Greek and Roman civilization, rise of Christianity, 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.

Course Descriptions

Hum 1002. Humanities in the West II. (3 cr; SP-\$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; SP-\$3003)
Civilization in 15th- and 16th-century Italy; religious and 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; SP-\$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; SP-\$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; SP-\$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 3001. Humanities in the West I. (4 cr; SP-\$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. (4 cr; SP-\$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; SP-\$1003)
Civilization in 15th- and 16th-century Italy; religious and 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; SP-\$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; SP-\$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; SP-\$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; SP-\$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; SP-\$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; SP-Jr or Sr or #)
Topics will vary from offering to offering and will be specified in *Class Schedule*.

Hum 3920. Honors Course: Topics in the Humanities. (2-4 cr; SP-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; SP-#)
Guided individual reading or study.

Hum 3971. Directed Studies. (1-4 cr; SP-#)
Guided individual reading or study.

Hum 4021. Historical Foundations of Modern Education. (3 cr; SP-\$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; SP-\$3023, \$EdPA 3023, \$EdPA 5023)
Great educational classics of Western civilization by: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, and others.

Hum 4837. Nietzsche as Cultural Critic. (2 cr; SP-Jr or Sr or Grad or #)
Nietzsche's contributions to philosophy, psychology, and criticism of religion, culture, and society.

Hum 4910. Topics in the Humanities. (2-4 cr; SP-Jr or Sr or Grad)
Topics will vary from offering to offering and will be specified in *Class Schedule*.

Hum 4920. Honors Course: Topics in the Humanities. (2-4 cr; SP-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; SP-Jr or Sr or Grad, #)
Guided individual reading or study.

Hum 4971. Honors Course: Directed Studies. (1-4 cr; SP-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; QP-ME upper division, registration in ME co-op program; SP-ME upper division, registration in ME co-op program; A-F only)
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; QP-ME undergrad, registration in ME co-op program; SP-ME upper div, registration in ME co-op program; A-F only)
Industrial work assignment in engineering intern program. Evaluation based on student's formal written report.

IE 4043. Industrial Assignment III. (4 cr; QP-3742; SP-4042; A-F only)
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; QP-Math 1261 or equiv; SP-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; QP-Upper div or grad student; SP-Upper div or grad student)
Topics vary each semester.

IE 5441. Engineering Cost Accounting, Analysis, and Control. (4 cr; QP-IT upper div or grad student; A-F only)
Financial accounting, managerial accounting, engineering economics. Preparing financial statements, handling accounts payable and receivable, inventories, depreciation. Financing sources, capital cost and structure. Concepts of time value of money and risk used in managerial decision making. Design of cost accounting system and activity-based accounting.

IE 5511. Human Factors and Work Analysis. (4 cr; QP–Upper div IT or grad student or public health major; SP–Upper div IT or grad student; A-F only)
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; QP–IEOR 5010 or IEOR 5070; SP–Upper div IT or grad student, 5511; A-F only)
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; QP–IT or grad student; SP–Upper div IT or grad student; A-F only)
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; QP–IT or grad student; SP–[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; QP–Math 1261, [IT or grad student]; SP–Upper div or grad student or CNR)
Linear programming, simplex method, duality theory, sensitivity analysis, interior point methods, integer programming, branch/round/dynamic programming. Emphasizes applications in production/logistics, including resource allocation, transportation, facility location, networks/flows, scheduling, production planning.

IE 5541. Project Management. (4 cr; QP–IT sr or grad student; SP–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 5551. Production Planning and Control. (4 cr; QP–[IT or grad student], IEOR 5040, ME 3900; SP–Upper div or grad student or CNR)
Inventory control, supply chain management, demand forecasting, aggregate planning, capacity planning, material requirement planning, just-in-time manufacturing, cellular manufacturing, production scheduling, line balancing, shop floor control.

IE 5552. Design and Analysis of Manufacturing Systems. (4 cr; QP–IT or grad student, IEOR 5010, IEOR 5020, IEOR 5030, IEOR 5040; SP–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 of Manufacturing Systems. (4 cr; QP–IT upper div or grad student; SP–Upper div or grad student or CNR)
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.

IE 5554. Facility Planning. (4 cr; QP–IT or grad student; SP–Upper div or grad student or CNR)
Design/planning of manufacturing/service facilities. Warehousing/storage, facility layout/location, material handling, material transportation distribution.

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. (2 cr; QP–BA 1001 or experience using Windows and Internet; SP–BA 1001 or experience using Windows and Internet; A-F only)
Developing and using IS to support business processes, management and decision making. Technology components of IS; impact on organizations; creation and change processes; selected managerial issues; techniques for designing, developing, implementing systems; databases and user interfaces; computer and communications network platforms.

IDSc 3111. Information Systems for Business Processes and Management. (2 cr; QP–CSOM business minor student; SP–CSOM business minor student; A-F only)
Developing/using IS to support business processes, management, and decision making. Technology components of IS, impact on organizations. Creation/change processes. Selected managerial issues. Techniques for designing, developing, implementing systems. Databases, user interfaces. Computer/communications network platforms.

IDSc 3201. Information Systems Application Development. (4 cr; QP–3030, MIS major; SP–3001, MIS major; A-F only)
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; QP–[3201, 3030]; SP–[3201, 3001]; A-F only)
Concepts and methods for business process engineering and systems analysis; techniques, activities, and issues for management and control of systems development at the project level; skill development for traditional and object-oriented analysis.

IDSc 4102. Introduction to Information Systems Analysis. (3 cr; QP–3030; SP–3001; A-F only)
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; QP–3030; SP–3001; A-F only)
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; SP–4103; A-F only)
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; SP–4102; A-F only)
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; QP–3030; SP–3001; A-F only)
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; QP–3130, 3140; SP–3202; A-F only)
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; QP–3150; SP–4203; A-F only)
Information services as a function and conceptual basis. Relationship of the function, roles, and organizational structures. IS planning and business strategy, skill development, and career pathing. Management of acquisition, subcontracting, outsourcing, operations, and user support.

IDSc 4421. Financial Information Systems and Technologies. (2 cr; QP–3030; SP–3001; A-F only)
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; QP–3130/3140; SP–3202; A-F only)
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; SP–3202; A-F only)
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 and managing databases in a distributed environment. Data integrity, security, and privacy.

IDSc 4441. Electronic Commerce. (2 cr; QP–Senior standing and 2 courses in chosen major; SP–Senior standing and 2 courses in chosen major; A-F only)
Service relationships as a conceptual basis. An evolutionary execution strategy based on application of basic business principles of key functions using proven product development practices. Measurement and evaluation principles and practice. Case studies from advertising, marketing, and fulfillment functions.

IDSc 4451. Telecommunications Fundamentals and Applications. (2 cr; QP–3130/3140; SP–3202; A-F only)
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; QP–3450; SP–[4451]; A-F only)
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.

Course Descriptions

IDSc 4490. Information Systems Special Topics. (2 cr; QP-3130/3140; SP-3202; A-F only)

Discussion and analysis of current topics and developments in information systems.

IDSc 4491. Independent Study in Information Systems. (1-4 cr; QP-#; SP-#; A-F only)

IDSc 4496. Information Systems Industry Internship. (2 cr; QP-3130/3140, Δ; SP-3202, Δ; A-F only)

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 5011. Internet Infrastructure. (3 cr; QP-CSci 5211 or #; SP-CSci 5211 or #; A-F only)

Routing protocols, switching technology, network access methods/protocols, trunk technology. Security principles in context of Internet/enterprise intranets. Lectures, labs, outside readings.

INet 5020. Advanced Network Design and Operation (BNA Capstone). (3 cr [max 12 cr]; QP-CSci 5211 or #; SP-CSci 5211 or #; A-F only)

Network infrastructure, threats to computing environment, operations management, understanding business need. Designing/managing local area networks. Aligning technology with organizational goals, managing vendor relations, planning projects, forecasting capacity, estimating capital, developing strategy. Lecture, case study (or lab).

INet 5030. Emerging Network Technologies and Applications (BIN Capstone). (3 cr [max 9 cr]; QP-CSci 5211 or #; SP-CSci 5211 or #; A-F only)

Underlying theory. Driving needs (technological, business). Developing technology. Competing technologies. Lectures by guest expert speakers, case studies, labs.

Institute of Technology (IoT)

Institute of Technology

IoT 0001. Fundamentals of Engineering Review (E.I.T. Refresher). (0 cr; QP-Bachelor's degree in engineering; SP-Bachelor's degree in engineering; S-N only)

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.

IoT 1101. Environmental Issues and Solutions. (4 cr; QP-[High school chemistry or equiv], one yr high school algebra; SP-[High school chemistry or equiv], one yr high school algebra)

Importance of science in understanding/solving various environmental problems. Case studies. Laboratory exercises.

IoT 1312. Exploring Careers in Science and Engineering. (2 cr; S-N only)

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.

IoT 1901. Freshman Seminar, Environment. (1-3 cr; A-F only)

Topics vary. See *Class Schedule*.

IoT 1905. Freshman Seminar. (1-3 cr)

Topics vary. See *Class Schedule*.

IoT 1909W. Freshman Seminar, International Perspective/Writing Intensive. (1-3 cr; A-F only)

Topics vary. See *Class Schedule*.

IoT 1910W. Freshman Seminar, Writing Intensive. (1-3 cr; A-F only)

Topics vary. See *Class Schedule*.

Insurance (Ins)

Industrial Relations Center

Curtis L. Carlson School of Management

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; SP-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; SP-5200)

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.

Interdepartmental Study (ID)

Office for Special Learning Opportunities

College of Liberal Arts

ID 1201. Career Exploration. (2 cr; SP-Fr or soph)

Students learn about their unique interests, skills, personality, values. Using this information in choosing major/career. Importance of internships, community service, other practical experiences.

ID 3201. Career Planning. (2 cr)

For juniors and seniors. A practical introduction to integrating individual talents, values, interests, and experience with critical career search strategies. Emphasis on understanding the marketplace, internet research, strategic resume writing, networking, and interviewing.

ID 3211. Internship: Perspectives on Work. (4 cr; QP-Δ, must have internship through OSLO; SP-Δ, must have internship through OSLO)

Combines practical experience in an internship with reflection upon work in our society. Topics include organizational structure, work as a cultural phenomenon, history of the concepts of work, and relationship of work to the 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; SP-#)

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; QP-#; SP-#)

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; QP-Δ; SP-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; QP-3205; SP-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; QP-#; SP-#)

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; QP-Δ; contact OSLO, 345 Fraser Hall, 626 2044; SP-Δ; contact OSLO, 345 Fraser Hall, 626 2044)

Active learning off-campus program that explores 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; QP-Δ; contact OSLO, 345 Fraser Hall, 626-2044; SP-Δ; contact OSLO, 345 Fraser Hall, 626-2044)

Active learning off-campus program that explores 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; QP-Δ; contact OSLO, 345 Fraser Hall, 626-2044; SP-Δ; contact OSLO, 345 Fraser Hall, 626-2044)

Active learning off-campus program that explores 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; QP-Δ; contact OSLO in 345 Fraser Hall, 626-2044; SP-Δ; contact OSLO in 345 Fraser Hall, 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; SP-Δ; contact OSLO, 345 Fraser, 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; SP-Δ; contact OSLO, 345 Fraser, 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]; QP-#, Δ, □ SP-#, Δ, □) Guided individual reading or study.

Interdisciplinary Archeological Studies (InAr)

College of Liberal Arts

InAr 5100. Topics in Interdisciplinary Archaeological Studies. (3 cr; SP-InAr grad major or #; A-F only) 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. (4 cr) Emphasis on the four language skills (listening, speaking, writing, and reading) and on Italian culture.

Ital 1002. Beginning Italian. (4 cr) Emphasis on the four language skills (listening, speaking, writing and reading) and on Italian culture.

Ital 1003. Intermediate Italian. (4 cr; SP-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. (4 cr; SP-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; SP-1104) Intensive reading, writing, and speaking practice and study of cultural materials in authentic formats.

Ital 3201. Reading Italian Texts: Poetics, Rhetoric, Theory. (3 cr; SP-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; SP-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; SP-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; SP-3015) Prose, verse, and drama of Italy under the Signorie and foreign invaders, 1400-1650.

Ital 3301. Italian Dialects and Their Literature. (4 cr; SP-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; SP-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 *Clytemnestra*.

Ital 3501. The World in the City: Italy 1100-1660. (3 cr; SP-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; SP-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; SP-3015) Italian drama, festival and spectacle from the medieval sacred plays to the reform of the theater by Goldoni.

Ital 4307. Novellistica. (3 cr; SP-3201, or permission of DUS) Study of birth and development of the novella genre. Reading and discussion of stories from the Novellino, Boccaccio, Sacchetti, Bandello, Bigolini, Basile, Verga, Deledda, Calvino, Introduction to formal study of novella structure.

Ital 4970. Directed Readings. (1-4 cr; SP-#) 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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-#) 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)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Jpn 1011. Beginning Japanese. (5 cr) An introduction to speaking, reading, and writing Japanese.

Jpn 1012. Beginning Japanese. (5 cr; SP-1011) Introduction to speaking, reading, and writing Japanese.

Jpn 3001. Japanese Calligraphy and Appreciation I. (2 cr; QP-1011; SP-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; QP-1012 or #; SP-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; SP-1012 or #) Intermediate speaking, reading, and writing in Japanese.

Jpn 3022. Intermediate Japanese. (5 cr; SP-3021 or #) Intermediate-level instruction in speaking, reading, and writing in Japanese.

Jpn 3031. Third-Year Japanese. (4 cr; SP-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; SP-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) Tutorial.

Jpn 3162. Traditional Japanese Literature in Translation. (3 cr; SP-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; SP-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.

Course Descriptions

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 U.S.

Jpn 3451. Introduction to Japanese Linguistics. (3 cr; SP-3022 or #)

Analysis of structure and meaning of Japanese sentence patterns.

Jpn 3993. Directed Studies. (1-15 cr [max 15 cr]; SP-#, Δ, □)

Directed study in topics of Japanese literature or linguistics.

Jpn 4041. Advanced Japanese Conversation and Composition. (4 cr; SP-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; SP-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; SP-3021, 3022)

Study of the structures and arguments of classical Japanese poetry, narrative, and drama.

Jpn 4062. Classical Japanese. (4 cr; SP-4061 or #)

Analysis of the structures and arguments of classical Japanese poetry, narrative, and drama.

Jpn 5071. Communicative Competence for Japan-Oriented Careers. (4 cr; SP-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; SP-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; SP-3162, 4061 or # when readings are in Japanese; 3162 or # when in translation; A-F only)

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; SP-3162, course from classical Japanese language sequence or #; A-F only)

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; SP-3162, course from classical Japanese language sequence or #; A-F only)

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; QP-Third-yr Japanese or #; SP-3032 when readings are in Japanese or #; A-F only)

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; QP-Third-year Japanese or #; SP-3032 when offered in Japanese or #; A-F only)

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; SP-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 5171. Women's Writing in Premodern Japan in Translation. (4 cr; SP-3162 or #; A-F only)

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; SP-3032, 5451 or #)

Development of Japanese grammar from classical to the modern language.

Jpn 5451. Structure of Japanese: Syntax/Semantics. (4 cr; SP-3032, Ling 3001 or #)

Analysis of structure and meaning of Japanese sentence patterns.

Jpn 5452. Structure of Japanese: Phonology/Morphology. (4 cr; SP-3032, Ling 3001 or #)

Generative and nongenerative approaches to Japanese sound and word structure.

Jpn 5453. Structure of Japanese: Discourse/Conversation Analysis. (4 cr; SP-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]; SP-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]; SP-#, 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; SP-§3034, §RelA 1034, §RelA 3034; 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 3013W. Biblical Law and Jewish Ethics. (3 cr; SP-§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; SP-§1034, §RelA 1034, §RelA 3034; 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 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; SP-§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; SP-§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; SP-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 3521. 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]; SP-#)

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; SP-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; SP–\$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; QP–ReIS 3541; SP–JwSt 3521 or ReIS 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 5992. Directed Readings. (1-12 cr [max 12 cr]; SP–#) 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; SP–Open to non-jour majors; A-F only) 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 3004W. Information for Mass Communication. (3 cr; SP–[EngC 1011 or equiv or exemption], [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only) 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; QP–3004, [jour major or jour minor], Δ: SP–3004, [jour major or jour minor or English major 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]; A-F only) 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; QP–Jour maj or minor, 3004, Δ: SP–Open to non-jour major; jour major must have course appr on prog plan; pre-jour should not enroll; A-F only) Using a case-studies approach to focus on legal and ethical issues, the course examines media in the socioeconomic-political-technological context of a specific historical period.

Jour 3008. Mass Communication Processes and Structure. (3 cr; SP–Open to non-jour major; jour maj must have course appr on prog plan; pre-jour should not enroll; A-F only) Communication theories as they relate to mass communication processes; major structural aspects of mass communication systems as they affect mass communication processes.

Jour 3101. Newswriting and Reporting. (4 cr; QP–3004, 3011, 40 wpm keyboard test; SP–[Jour major or jour minor or IDIM major or ICP major or BIS major]; typing skill; A-F only) Fact gathering, journalistic writing. Problems in judgment/handling of news/news features.

Jour 3121. Public Affairs Reporting. (3 cr; SP–3004, 3101 with grade of at least C-, [jour major or IDIM major or ICP major or BIS major]; typing skills; A-F only) Reporting/editing news of courts and municipal, county, state, and federal administrative/legislative agencies.

Jour 3155. Publications Editing. (3 cr; SP–3004, grade of at least C in 3101, [jour or IDIM or ICP or BIS] major, typing skill; A-F only) Selection/editing of news-editorial content of newspapers, brochures, magazines, newspaper makeup, magazine format. Press association teletype service. Lecture, lab.

Jour 3159. Public Relations. (3 cr; SP–[EngC 1011 or equiv or exemption], [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only) History/development of public relations practice/principles. Professional writing assignments in various institutional settings. Analysis/critique of public relations in contemporary society.

Jour 3173W. Magazine Writing. (3 cr; SP–3004, grade of at least C in 3101, [jour or IDIM or ICP or BIS] major, typing skill; A-F only) Writing feature articles for consumer/trade publications. Market free-lance methods.

Jour 3179. Public Relations Writing and Campaign Tactics. (3 cr; SP–3004, [3159 or 3201], [jour major or IDIM major or ICP major or BIS major]; A-F only) Public relations tactics. Emphasizes professional skills in writing for various audiences/purposes.

Jour 3201. Principles of Advertising. (3 cr; SP–[Jour major or jour minor or design comm premajor or design comm major or graphics design premajor or graphics design major or ForP major or Mktg major or Hort major or IDIM major or ICP major or BIS major, [fr composition or exemption]; A-F only) 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 3241. Creative Strategy and Copywriting. (3 cr; SP–3004, 3201, [jour major or IDIM major or ICP major or BIS major]; A-F only) Advertising appeals/strategy. Advertising for print/broadcast. Individual/group projects.

Jour 3251. Advertising and Public Relations Research. (3 cr; QP–3004, [3159 or 3201], jour major, Δ: SP–3004, [3159 or 3201], [jour major or IDIM major or ICP major or BIS major]; A-F only) Introduction to applied quantitative/qualitative research methods in advertising/public relations campaign development, management, and evaluation.

Jour 3321. Basic Media Graphics. (3 cr; SP–Jour major or IDIM major or ICP major or BIS major; A-F only) Mass media graphics, including design principles/history, production technology, typographic legibility research, analysis of printing, and production costs.

Jour 3451. Television and Radio News. (3 cr; SP–3004, grade of at least C in 3101, [jour or IDIM or ICP or BIS] major, typing skill; A-F only) News writing, reporting, video photography/editing, on-air delivery. Production of weekly University newscast for cable.

Jour 3614. History of Media Communication. (3 cr; SP–Open to non-jour majors, jour major must have course appr on prog plan; pre-jour major should not enroll; A-F only) How people have used the tools of communication from earliest times to the present. The impact of new technologies on society. The road to the information superhighway.

Jour 3741. Racial Minorities and the Mass Media. (3 cr; QP–Open to non-jour major; jour major must have course appr on prog plan; pre-jour should not enroll; SP–Open to non-jour major; jour major must have course appr on prog plan; pre-jour should not enroll; A-F only) Past and present depictions of minority individuals and groups in movies, literature, radio/TV, etc., against anthropological, psychological, and sociological knowledge and experience. Emphasis on personal and political effects of media depictions.

Jour 3745. Mass Media and Popular Culture. (3 cr; SP–Open to non-jour major; jour major must have course appr on prog plan; pre-jour should not enroll; A-F only) Mass media’s role in the 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 and commercial pressures influencing media representation.

Jour 3771. Mass Media Ethics: Moral Reasoning and Case Studies. (3 cr; SP–Open to non-jour majors; jour major must have course appr on prog plan; pre-jour major should not enroll; A-F only) 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; SP–3004, [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only) 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; SP–Open to non-jour majors, jour 1001 or Pol 1001 or #, jour major must have course appr on prog plan; A-F only) Analysis of role of mass media in politics; emphasis on television and electoral campaigns; news coverage vs. newsmaking. Free press in democracy.

Jour 3990. Special Topics in Mass Communication. (3-4 cr; SP–Jour major or jour minor or IDIM major or ICP major or BIS major; A-F only) Topics specified in *Class Schedule*.

Jour 3993. Directed Study. (1-3 cr [max 6 cr]; SP–3004, [jour major or jour minor or IDIM major or ICP major or BIS major], #, □ A-F only) Directed study, projects.

Jour 3996. Directed Instruction. (1 cr; QP–Jour major, adviser approval, Δ: one course for professional majors, one adviser-approved course for mass comm majors; SP–Jour major, adviser approval; one course for professional majors, one adviser-approved course for mass comm majors; S-N only) Internship at grad or undergrad level supervised by communications organization at which student is working and by student’s academic sponsor.

Jour 4131. Interpretive Reporting. (3 cr; SP–3004, [3121 or 3173 or 4155], [jour or IDIM or ICP or BIS] major, typing skill; A-F only) Advanced problems in reporting about government, politics, social problems, and the arts.

Jour 4155. Advanced Reporting Methods. (3 cr; SP–3004, grade of at least C in 3101, [jour or IDIM or ICP or BIS] major, typing skill; A-F only) Investigative techniques for mass media. Quantitative research methods, use of records/documents, analysis of statistics, advanced interviewing, methods for adverse conditions.

Jour 4159. Case Studies in Public Relations. (3 cr; SP–3004, 3159, [jour major or IDIM major or ICP major or BIS major]; A-F only) Public relations principles applied to problems in business, government, education, and community. Practical/ethical questions. Case studies.

Jour 4171. Arts Reviewing and Reporting. (3 cr; SP–3004, grade of at least C in 3101, [jour or IDIM or ICP or BIS] major, typing skill; A-F only) 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. Magazine Editing and Production. (3 cr; SP–[3004, [3155 or 3173 or 3321 or 5302 or professional experience equiv to 5302], [jour major or IDIM major or ICP major or BIS major]; A-F only) Writing, editing, illustration, design, layout, and photocomposition of single-edition magazine.

Course Descriptions

Jour 4261. Advertising: Media Analysis. (3 cr; SP-3004, [3159 or 3201], [jour major or mktg major or IDIM major or ICP major or BIS major]; A-F only)
Print/electronic media and their role in advertising. Selection/scheduling, rate structures/policies, evaluation/use of media/market measurements/data.

Jour 4263. Advertising Campaign Planning. (3 cr; SP-[3179 or 3241 or 4159 or 4261], Mktg 3000, [jour major or mktg major or IDIM major or ICP major or BIS major] or #; A-F only)
Developing campaign strategy/tactics. Emphasizes planning/decision-making skills.

Jour 4274. Advertising in Society. (3 cr; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only)
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 4321. Publication Graphics. (3 cr; SP-3004, 3321, [jour major or IDIM major or ICP major or BIS major]; A-F only)
Design process applied to production of magazines, brochures, newsletters. Computer as tool to prepare electronic documents for printing.

Jour 4441. Documentary Production. (3 cr; SP-[4442, [jour major or IDIM major or ICP major or BIS major] or #; A-F only)
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. Advanced Television News. (3 cr; SP-3004, 3451, [jour or IDIM or ICP or BIS] major, typing skill; A-F only)
Preparation/delivery of television newscasts. Industry problems, legal/ethical considerations, social impact of electronic journalism. Lecture, lab, news production.

Jour 4611. Development of American Broadcasting. (3 cr; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only)
Historic/economic development of U.S. radio/television. Government regulation, industry self-regulation, forms of social control. Issues in contemporary broadcasting. Journalist as broadcaster.

Jour 4615. History of Visual Communication in Mass Media. (3 cr; SP-Non-jour major; jour major must have course appr on prog plan; A-F only)
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; SP-[3004, [jour major or jour minor or English major or IDIM major or ICP major or BIS major] or #; one writing-intensive course recommended; A-F only)
Economic, political, social determinants of character/content of mass communications in America. Impact, structure, functioning of mass media. Problems, prospects, criticism. Professionalism, technology, reform.

Jour 4731H. Honors: Communications Problems and Issues. (3 cr; SP-3004, sr, [jour major or jour minor or IDIM major or ICP major or BIS major], honors, #; A-F only)
Individual project. Seminar.

Jour 4801. International Communication. (3 cr; QP-3004, [jour major or jour minor], A; SP-Non-jour major; jour major must have course appr on prog plan; A-F only)
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 4993H. Honors: Directed Study. (1-3 cr [max 6 cr]; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major], GPA of at least 3.0, honors div regis, □ #: A-F only)
Independent study/projects.

Jour 5251. Psychology of Advertising. (3 cr; SP-3004, Psy 1001, [jour major or jour minor or design comm premajor or design comm major or graphic design premajor or graphic design major or ForP major or Mktg major or Hort major or IDIM major or ICP major or BIS major]; A-F only)
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; SP-3004, 3006, [jour major or jour minor or IDIM major or ICP major or BIS major] or #; A-F only)
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; SP-Open to non-jour majors; jour major must have course appr on prog plan; pre-jour major should not enroll; A-F only)
Theories of communication, persuasion, attitude change. Functions of interpersonal/mediated communication in diffusion of information and in opinion formation.

Jour 5531. Communication and Public Opinion II. (3 cr; QP-3004, [5501 or Soc 5355], [jour major or jour minor], A; SP-3004, [5501 or Soc 5355], [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only)
Advanced study of theories/research on opinion formation, persuasion, and diffusion of information. Social science contributions to studies of process/effects of mass communication.

Jour 5541. Mass Communication and Public Health. (2-3 cr; SP-3004, [jour major or jour minor or grad major or PubH major or IDIM major or ICP major or BIS major], 12 cr in social or behavioral sci; A-F only)
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; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only)
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; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only)
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; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only)
Introduction to concepts/principles of media management. Strategic planning, leadership, organizational strategies, ethical/legal issues. Working in teams. Understanding a balance sheet and income statement. Motivating/promoting people.

Jour 5726. Case Studies in Modern Media Management. (3 cr; SP-3004, [[jour or IDIM or ICP or BIS] major or jour minor]; [4725 or 5725] recommended; A-F only)
Key issues confronting media organizations. Mission: integrating journalism, business, entertainment; corporate citizenship, public relations. Deciding what organization does: business/market definition, performance measurement, management of creative process. Investment: new business, media boundaries, technology.

Jour 5741. Minorities and Mass Media. (3 cr; QP-Jour major or minor, 3004, A; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only)
Analysis of relationships between mass media and communities of color in the United States. Focuses on issues of content/control.

Jour 5771. Media Ethics: Principles and Practice. (3 cr; SP-Open to non-jour majors; jour major must have course appr on prog plan; A-F only)
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; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major]; A-F only)
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; SP-3004, [jour major or jour minor or IntR major or IDIM major or ICP major or BIS major]; A-F only)
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. (3-4 cr; SP-Jour major or jour minor or IDIM major or ICP major or BIS major or #; A-F only)
Topics specified in *Class Schedule*.

Jour 5993. Directed Study. (1-3 cr; SP-3004, [jour major or jour minor or IDIM major or ICP major or BIS major], GPA of at least 3.00, □ #: A-F only)
Directed study/projects.

Kinesiology (Kin)

School of Kinesiology and Leisure Studies 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; SP-\$1999; A-F only)
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; QP-#; SP-#; A-F only)
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]; SP-4 cr of 1050 or #; A-F only) 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; SP-§3110; A-F only)

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;

QP-[[3111 or CBN 1027], CEHD student] or #; SP-[[3111 or CBN 1027], Phys 1101W, CEHD student] or #; A-F only) 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; SP-§3112 (quarter version); A-F only) 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; QP-[3110, CBN 1027, CEHD student] or #; SP-[[3111 or CBN 1027], CEHD student] or #; A-F only) Principles in athletic training for prevention/care of injury. Taping/bracing techniques. Lab.

Kin 3126. Psychology and Sociology of Sport. (3 cr; SP-Kin majors; A-F only)

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 3131. History and Philosophy of Sport. (3 cr [max

3 cr]; QP-Kin majors or #; SP-Kin majors or #; A-F only) 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; SP-Kin maj or #; §Kin 3132, 3135; A-F only) 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; QP-2-credit coaching course, Kin major or #; SP-Kin major or #; A-F only) 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; QP-Kin major or #; SP-Kin major or #; §3150; A-F only) 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; QP-PE 1872; SP-§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; QP-PE 1174 or #;

SP-Good understanding of volleyball) Motivation, team building, communication, game strategies, philosophy. Lecture, discussion, practical application.

Kin 3171. Baseball Coaching. (1 cr [max 1 cr]; SP-Kin

3170) 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; SP-§Kin 3171)

Teaching and coaching individual and team skills of the game; rules and strategies.

Kin 3173. Football Coaching. (1 cr; SP-§Kin 3172)

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; SP-§Kin 3174)

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; SP-§Kin 3175)

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;

SP-§Kin 3176) 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; SP-§Kin 3177)

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; SP-§Kin

3178) Basic training and conditioning programs, event characteristics, coaching strategies, knowledge of track and field, meet administration.

Kin 3181. Wrestling Coaching. (1 cr; SP-§Kin 3179)

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; QP-Elementary major; SP-Elementary major; A-F only)

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; QP-CBN 1027 or equiv, Kin major or #; SP-CBN 1027 or equiv, Kin major or #; A-F only) Tissue and organ function, cell structure, cellular enzymes, energy production, and chemical composition of the body. Nervous, muscular, endocrine, circulatory, renal, respiratory and gastrointestinal physiological control systems studied in detail using clinical, exercise, sport, and work examples.

Kin 3696. Supervised Practical Experience. (1-10 cr

[max 10 cr]; QP-#; SP-Kin major, #; §3625; S-N only) 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]; QP-#; SP-#; A-F only) Student-selected clinical or research experience.

Kin 4385. Exercise Physiology. (4 cr; QP-3385 or equiv,

Kin major or #; SP-3385 or equiv, Kin major or #; 3386; A-F only) 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; QP-If certification as Adapted Aquatic Instructor desired, then current American Red Cross Water Safety Instructor or equivalent YMCA certification is required; SP-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; QP-Kin or rec grad

student or MEd student; SP-§Rec 5111; Kin or Rec grad student or MEd student; A-F only)

Steps in planning/building facilities for athletics, physical education, and sport for college, professional, and public use.

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; QP-4385

or equiv or #; SP-4385 or equiv or #; A-F only) 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; QP-#; SP-#;

A-F only) In-depth view of the concepts, problems, and issues associated with ergonomic applications to improving the design and operation of human workspaces.

Kin 5126. Sport Psychology. (3 cr; SP-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; QP-[3132

or #], phys ed lic; SP-3133 or #; A-F only) Developmental aspects of human movement behavior/learning. Life span change of motor skills.

Course Descriptions

Kin 5135. Motor Control and Learning. (3 cr; QP–3135 or #; SP–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; QP–FScN 1612 or equiv; SP–FSci 1121 or equiv; A-F only)

Requirements and physiologic roles of nutrients and physical activity in promotion of health and performance; assessment of energy requirements. RDAs, food composition and safety, weight management, and prevention of chronic diseases with emphasis on coronary heart disease.

Kin 5152. Curriculum Development in Physical Education. (2 cr; QP–Init lic/MEd phys ed student or #; SP–Init lic/MEd phys ed student; A-F only)

Trends, issues, and challenges in early childhood/K-12 physical education. Potential effect on curriculum.

Kin 5171. Foundations of Kinesiology. (3 cr; SP–Kin major or #; A-F only)

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]; QP–5100 or equiv or #; SP–5103 or equiv or #; S-N only)

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; SP–[3112 or equiv], PMed 5135, undergrad college physics, intro calculus; A-F only)

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; QP–Grad or #; SP–Grad or #; A-F only)

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; QP–3001; SP–3001; A-F only)

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; QP–5126, grad or #; SP–3126, grad or #; A-F only)

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; QP–Undergrad physiology or biology; SP–Undergrad physiology or biology; A-F only)

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 5461. Foundations of Sport Management. (3 cr; QP–Kin or rec major; grad, MEd; SP–Kin or rec major; grad, MEd; \$5460, \$Rec 5460; A-F only)

Principles of sport management including theories and techniques in administration and management of sport enterprises. Organizational theory and policy with practical examples of sport management skills and strategies.

Kin 5511. Women in Sport and Leisure. (3 cr; SP–\$Rec 5511; A-F only)

Critically examines women's involvement in/contributions to sport, physical activity, and leisure.

Kin 5621. Advanced Athletic Training: Evaluation of Athletic Injury. (3 cr; QP–3114, CBN 1027; SP–3114, CBN 1027; A-F only)

Theory, principles, and techniques necessary to recognize and evaluate athletic injury that occurs to all major body parts.

Kin 5622. Therapeutic Modalities in Athletic Training. (3 cr; QP–3114; SP–3114; A-F only)

Theoretically based guide for the use of therapeutic modalities for the management of athletic injuries in a practical setting.

Kin 5697. Student Teaching: Coaching. (1-10 cr [max 10 cr]; QP–#; SP–Admission to coaching program, #; S-N only)

Student coaching experience under supervision of a mentor coach.

Kin 5720. Special Topics in Kinesiology. (1-8 cr [max 9 cr]; SP–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; SP–Grad student or #; A-F only)

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; QP–Intro psych course; SP–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; QP–Grad/init lic or #; SP–Grad/init lic or #; A-F only)

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; QP–Kin major, MEd student, or #; SP–Kin major, MEd student, or #; A-F only)

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; QP–Kin major, MEd student, or #; SP–Kin major, MEd student, or #; A-F only)

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]; QP–PEL; SP–PEL; A-F only) 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; QP–Kin or rec major; SP–\$Rec 5801; kin or rec major; A-F only)

Legal issues related to recreation, park, and sport programs/facilities in public/private sectors.

Kin 5941. Neural Basis of Movement. (3 cr; SP–[[3111, CBN 1027] or equiv], [Phsl 3051 or equiv]; A-F only)

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; QP–3150 or equiv; SP–\$REC 5981; 3151 or equiv; A-F only)

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]; QP–CEHD student, grad, #; SP–CEHD student, grad, #; A-F only)

Independent study under tutorial guidance.

Kin 5995. Research Problems in Kinesiology or Physical Education. (1-6 cr [max 6 cr]; QP–Grad student or [MEd student in kin, Phys Ed Lic] or #; SP–Grad student or MEd student in kin or #; A-F only)

Focus on selected topics in physical activity/human performance.

Korean (Kor)

*Institute of Linguistics and Asian and Slavic Languages and Literatures
College of Liberal Arts*

Kor 1011. Beginning Korean. (4 cr)

Basic grammatical structure, vocabulary, and expressions of modern colloquial Korean. Introduces Korean writing system.

Kor 1012. Beginning Korean. (4 cr; SP–1011)

Basic grammatical structure, vocabulary, and expressions of modern colloquial Korean.

Kor 3021. Intermediate Korean. (4 cr; QP–1013; SP–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. (4 cr; SP–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; QP–3023; SP–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; SP–3031)

Speaking, reading, writing at advanced level in modern colloquial Korean. Narration, written reports. Further Chinese characters introduced.

Kor 3940. Korean Culture and History. (3 cr)

Introduction to Korean society/culture. History, material culture, religion, family/kinship, weddings. Lectures, discussions, videos.

Laboratory Medicine and Pathology (LaMP)

Department of Laboratory Medicine and Pathology

Medical School

LaMP 3050. Pathology for Mortuary Science Students. (3 cr; QP–Regis mort sci major; SP–Regis mort sci major; A-F only)

Students are assigned to laboratory and cooperative learning groups. Examine photos of gross or microscopic pathology to learn basic principles of disease and identify external evidence of traumatic injury. View at least one autopsy. Twenty-one lectures, five 2-hr labs.

LaMP 4172. Pathology for Allied Health Students. (3 cr; QP–Regis allied health program, anatomy course, physiology course or #; SP–Regis allied health program, anatomy course, physiology course or #)

General and organ system pathology.

LaMP 4177. Pathology for Allied Health Students. (3 cr; QP–Regis allied health program, anatomy course, physiology course or #; SP–Regis allied health program, anatomy course, physiology course or #)

General and organ system pathology.

LaMP 5100. General and Systemic Pathology for Dental Students. (4 cr; SP–Regis dental student; A-F only)

Causes, courses, mechanisms and outcomes of disease. Required as preparation for clinical dental practice and oral 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.

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 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; QP–BED major or #; SP–BED major or #; A-F only)

Introduction to spatial design issues at all scales.

LA 3413. Introduction to Landscape Architectural History. (3 cr [max 3 cr]; SP–One course in history at 1xxx or higher; A-F only)

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 5201. Making Landscape Spaces and Types. (6 cr; SP–BED accelerated status or LA grad or #; A-F only)

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; A-F 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; QP–5211, 5213, 5202 or concurrent regis or ecology course or #; SP–5201, 5202 or concurrent regis or ecology course or #; A-F only)

A design studio experience drawing on ecological, cultural, and aesthetic influences to explore the development of design ideas that are responsive to ecological issues and human experience.

LA 5301. Introduction to Drawing in Architecture and Landscape Architecture. (3 cr; A-F only)

Basic skills involved in perceiving/representing the material environment. Sketching/drawing conventions, visual phenomena/forms.

LA 5351. AutoCAD I. (3 cr; SP–B.E.D. major or LA grad or #; may not be taken for graduate credit; A-F only)

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; SP–Arch 5351 or LA 5351, B.E.D. major or LA grad or #; may not be taken for graduate credit; A-F only)

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; SP–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; SP–Arch/LA 5371, LA grad or #)

Current techniques and computer programs, and their application to landscape architecture computing.

LA 5373. Computer Methods III. (1 cr; SP–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]; SP–B.E.D. accelerated status or LA grad or #; A-F only)

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]; QP–Sr B.E.D. major or LA grad or #; SP–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]; QP–Sr B.E.D. major or LA grad or #; SP–B.E.D. accelerated status or LA grad or #; A-F only)

Independent studies under the direction of landscape architecture faculty.

LA 5403. Directed Studies in Landscape Architecture Technology. (1-6 cr [max 12 cr]; QP–Sr B.E.D. major or LA grad or #; SP–B.E.D. accelerated status or LA grad or #; A-F only)

Independent studies under the direction of landscape architecture faculty.

LA 5404. Directed Studies in Landscape Architecture Design. (1-6 cr [max 12 cr]; QP–Sr B.E.D. major or LA grad or #; SP–B.E.D. accelerated status or LA grad or #; A-F only)

Independent studies under the direction of landscape architecture faculty.

LA 5405. Interdisciplinary Studies in Landscape Architecture. (1-6 cr [max 12 cr]; QP–Sr B.E.D. major or LA grad or #; SP–B.E.D. accelerated status or LA grad or #; A-F only)

Research, planning, and/or design projects. Topics vary.

LA 5413. Introduction to Landscape Architectural History. (3 cr [max 3 cr]; SP–One course in history at 1xxx or higher; A-F only)

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. (4 cr; SP–B.E.D. major or LA grad or #)

Theory and professional applications of landform systems for design. Topics include landform typology, representation methods, manipulation techniques, use of land survey data, earthwork construction issues, and spatial accommodation of vehicles in landscape architecture, including road design.

LA 5572. Landscape Technology: Planted Form. (3 cr; QP–5211, 5212, plant identification course or #; SP–5201, 5203, plant identification course or #; A-F only)

Lectures, presentations, field trips, readings, and projects exploring design principles related to using plants in the landscape. Explores cultural and ecological principles through design projects of various scales.

LA 5573. Landscape Technology: Introduction to Geographic Information Systems. (3 cr; QP–Jr or sr B.E.D. major or LA grad or #; SP–Jr or sr B.E.D. major or LA grad or #; A-F only)

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.

Language, Teaching, and Technology (LgTT)

Institute of Linguistics and Asian 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.

Course Descriptions

LgTT 5110. Technology in the Second Language Classroom. (2 cr; SP-\$5611)
Examine, evaluate, and use technology in language teaching. Theoretical background, demonstration, hands-on exploration.

LgTT 5611. Technology in Second Language Instruction. (3 cr; SP-SLC postbac or #; A-F only)
Using audio, video, and computer technology in second language teaching/learning in classroom, independent study, and distance education environments.

Latin (Lat)

*Department of Classical and Near Eastern Studies
College of Liberal Arts*

Lat 1001. Beginning Latin I. (4 cr)
Gradual mastery of Latin structure in order to attain reading knowledge; practice in oral reading and composition.

Lat 1002. Beginning Latin II. (4 cr; SP-1001 or equiv)
Continuing work on Latin grammar and syntax; graduated readings from Roman authors including Cicero, Catullus, and Roman comedy.

Lat 1102. Beginning Latin II, Transition. (3.33 cr; QP-1101; A-F only)
Continuation of basic grammar/vocabulary, practice reading/writing. Latin readings, Roman legends.

Lat 1103. Selections from Latin Literature, Transition. (3.33 cr; QP-Lat 1102; A-F only)
Prose/poetry. Historical/literary background.

Lat 1111H. Honors Course: Beginning Latin. (3 cr; SP-¶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; SP-¶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 3111. Intensive Latin. (3 cr; SP-§1001-1002, §1111, ¶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; SP-§1001-1002, §1112, ¶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; SP-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; SP-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]; SP-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]; SP-3114 or equiv or #)
Selections from expository Latin literature (essays, epistles, monographs).

Lat 3330. Advanced Undergraduate Latin: Oratory. (3 cr [max 12 cr]; SP-3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3340. Advanced Undergraduate Latin: Epic/Pastoral. (3 cr [max 12 cr]; SP-3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3350. Advanced Undergraduate Latin: Lyric/Elegiac. (3 cr [max 12 cr]; SP-3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3360. Advanced Undergraduate Latin: Drama. (3 cr [max 12 cr]; SP-3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3370. Advanced Undergraduate Latin: Satire. (3 cr [max 12 cr]; SP-P3114 or equiv or #)
One or more appropriate authors studied each semester.

Lat 3440. Advanced Undergraduate Latin: Later Latin. (3 cr [max 12 cr]; SP-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]; SP-3114 or Δ)
Readings from various classical Latin authors. Topics specified in *Class Schedule*.

Lat 3951. Major Project. (4 cr; SP-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]; SP-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]; SP-# and Δ)
Guided individual reading or study.

Lat 5012. Latin Prose Composition. (3 cr; SP-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; SP-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]; SP-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]; SP-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]; SP-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]; SP-34xx or equivalent or #)
Literature from 6th to 15th centuries. Authors and genres vary; topics specified in *Class Schedule*.

Lat 5621. Latin Paleography. (3 cr; SP-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; SP-# 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]; SP-#, Δ)
Guided individual reading or study.

Lat 5994. Directed Research. (1-12 cr [max 20 cr]; SP-#, Δ)
Guided research on original topic chosen by student.

Lat 5996. Directed Instruction. (1-12 cr [max 20 cr]; SP-#, 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; SP-\$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; SP-\$Anth 3019; 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; SP-\$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; SP-\$FR 3251; A-F only)

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; SP-\$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; SP-\$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; SP-\$WoSt 3405; 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; SP-\$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; SP-\$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; SP-\$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; SP-\$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; SP-\$Port 3502; 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; SP-\$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; QP-DHA 3463; SP-\$DHA 4465; DHA 2401, DHA 2463 or #; A-F only)

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; SP-\$Pol 4479; 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)

College of Liberal Arts

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; SP-#, academic probation; S-N only)

Skilled assistance in identifying factors interfering with academic performance, selecting strategies and establishing a plan to promote academic success. Student learning style and skills, educational goals, life management skills, motivation, attitude as they relate to learning and academic performance.

LASK 1501. Returning to Learning. (2 cr)

Turn life goals into educational plans, address life management and learning/academic performance skills. Inventories about abilities, interests, and skills. Guidance for planning major and selecting courses, learning strategies, time management, note-taking, test-taking, writing skills.

LASK 3201. Effective Job Search and Interview Skills for Non-Native Speakers. (1 cr; SP-\$5201; S-N only)

Practical assistance for career search process; immediate/long-term career objectives. Develop effective job search strategies; refine written, verbal, behavioral communication job seeking skills; deal with diversity issues. Video-tape mock interviews.

LASK 3301. Career Development and Job-Seeking Skills for Students with Disabilities. (2 cr; SP-\$5301)

Adapt career planning, job-seeking process to specialized educational, vocational, personal, and social needs of students with disabilities. Assess skills, interests, values, personality, goals as related to career decisions. Practical assistance occupational choices, resumes, interviewing, evaluating job offers. Legal rights, discrimination, disclosure issues.

LASK 3303. Internship Experience for Students with Disabilities. (2 cr; SP-#, Δ; S-N only)

Gain work experience, future employment. Combine practical internship experience with classroom activities. Try out/assess work skills, identify employment strengths/weaknesses, improve job maintenance skills, determine reasonable job accommodations. Minimum four hrs/week at approved site.

LASK 3980. Tutor Training: Tutoring the College Student. (2 cr; SP-#, Δ; A-F only)

Training and practical experience in knowledge and fundamental skills essential to tutors across academic disciplines. Provides opportunity for tutor certification by the College Reading & Learning Association.

LASK 4001. Dynamics of Success: From Senior Year to New Professional. (1 cr)

Explores key issues as students progress to new professional or graduate education. Understand new roles, responsibilities; maximize benefits of undergraduate education. Topics include work/life balance, personal effectiveness, group dynamics, and organizational culture.

LASK 5201. Effective Job Search and Interview Skills for Non-Native Speakers. (1 cr; SP-\$3201; S-N only)

Practical assistance for career search process; immediate/long-term career objectives. Develop effective job search strategies; refine written, verbal, behavioral communication job seeking skills; deal with diversity issues. Video-tape mock interviews.

LASK 5301. Career Development and Job-Seeking Skills for Students with Disabilities. (2 cr; SP-\$3301)

Adapt career planning, job-seeking process to specialized educational, vocational, personal, and social needs of students with disabilities. Assess skills, interests, values, personality, goals as related to career decisions. Practical assistance occupational choices, resumes, interviewing, evaluating job offers. Legal rights, discrimination, disclosure issues.

LASK 5960. Topics in Graduate Studies. (1 cr; S-N only)

Special classes or seminars on topics related to successful learning and academic performance in graduate school. Topics listed in Learning and Academic Skills Center Office (104 Eddy Hall).

Linguistics (Ling)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Ling 1701. Language and Society. (3 cr)

Role of language in human social interaction; linguistic indicators of formal status and attitudes; language and sex roles; linguistic ecology; language planning for multilingual communities; implications for education and public policy.

Ling 3001. Introduction to Linguistics. (4 cr; QP-\$3011, \$5001; SP-\$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; QP-\$3001, \$3001H, \$3005, \$5001; linguistics honors candidate or #; SP-\$3001, \$3011, \$5001; linguistics 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; QP-Linguistics honors candidate, #; SP-Linguistics honors candidate, #) Supervised planning and research for honors thesis to be completed in 3052.**Ling 3052H. Honors: Thesis.** (3 cr; QP-3051H; SP-3051) Supervised research, writing, and revision for honors thesis begun in 3051.**Ling 3101W. Languages of the World.** (3 cr; QP-3001 or 3001H or #; SP-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; QP-\$5301; 3001 or 3001H or 5001 or ¶3001 or #; SP-\$5301; 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; QP-\$5601; 3001 or #; SP-\$5601; 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; QP-Some knowledge of linguistics and a 2nd language helpful; SP-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; QP-\$5201, \$5302; 3001 or 5001 or #; SP-\$5201, \$5302; 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; QP-Ling major, #; SP-Ling major, #; S-N only)

Revision and/or expansion of a paper completed for a linguistics course.

Ling 5001. Introduction to Linguistics. (4 cr; QP–\$3001, \$3001H; grad or #; SP–\$3001, \$3011; grad or #) Phonetics, phonology, morphology, syntax, semantics, and historical-comparative linguistics; language learning and psychology of language; linguistic universals; language in society.

Ling 5005. Introduction to Applied Linguistics. (3 cr; QP–3001 or 3001H or 5001 or #; SP–3001 or 3011 or 5001 or #)

Relationships between linguistics and neighboring disciplines; applications to practical fields such as lexicography, orthography, translation and interpreting, language planning, reading, language teaching, bilingual education, education of the deaf and correction of language disorders; computer applications; forensic applications. Topics may vary with each offering.

Ling 5101. Language Types and Linguistic Universals. (3 cr; QP–3001 or 3001H or 5001 or #; SP–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; QP–5201, 5302 or #; SP–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; SP–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; QP–3001 or 3001H or 5001 or #; SP–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; QP–5201; SP–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; SP–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; SP–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; QP–\$3301; 3001 or 3001H or 5001 or #; SP–\$3301; 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; QP–5301; SP–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; QP–5302 or #; SP–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; QP–3001 or 3001H or 5001 or #; SP–\$Spch 5461; 3001 or 3011 or 5001 or #)

Discourse processes. Application of concepts through conversation analysis.

Ling 5462. Field Research in Spoken Language. (3 cr; QP–5461 or Spch 5461 or #; SP–\$Spch 5462; 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; QP–3001 or 3001H or 5001 or #; SP–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; QP–3001 or 3001H or 5001, a course on phonological and grammatical structure of a language; SP–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; QP–\$3601; 3001 or 3001H or 5001; SP–\$3601; 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; QP–3001 or 3001H or 5001 or #; SP–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; QP–3001 or 3001H or 5001 or #; SP–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; QP–3001 or 3001H or 5001 or #; programming experience helpful; SP–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; QP–5401 or #; SP–5801 or #)

Computer processing of natural language. Applications to such areas as speech recognition and information retrieval.

Ling 5900. Topics in Linguistics. (3 cr; SP–#)

Topics vary. See *Class Schedule*.

Ling 5931. Fundamentals of Contemporary English. (3 cr; QP–3001 or 3001H or 5001 or #; SP–3001 or 3011 or 5001 or #)

Word and sentence structure of contemporary English.

Ling 5932. Descriptive Studies of Modern English. (3 cr; QP–3001 or 3001H or 5001 or #; SP–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; SP–#, Δ, □)

Directed study for Linguistics.

Management (Mgmt)

Department of Strategic Management

Curtis L. Carlson School of Management

Mgmt 2350. Introduction to Business and Business Careers. (4 cr; SP–CSOM soph; A-F only)

Career exploration and self-development for students. Introduction to functional areas of business and to issues related to the purpose of business.

Mgmt 3001. Fundamentals of Management. (2 cr; SP–At least 40 sem cr; A-F only)

Organizational analysis/behavior. Structure/functioning of complex organizations. Leadership/management for establishing goals, policies, procedures, plans. Motivation, culture, organizational design, group dynamics, performance appraisal, negotiation.

Mgmt 3070. Topics in Management: Evolution of American Management. (4 cr; SP–At least 60 credits completed or in progress; A-F only)

Introduction to history/development of American management as it underlies current management ideas/practice. Business organization, finance/marketing, management methods, education for management. Reading/in-class discussion of business cases and of past/present management literature.

Mgmt 3080. Topics in Ethics. (4 cr; SP–At least 60 credits taken or in progress; A-F only)

Selected topics/problems of current interest considered in depth. Class discussions, course projects.

Mgmt 3090. Topics in Leadership: Perspectives on Management. (4 cr; A-F only)

Developing/adopting a personal leadership position/values profile. How organizations with effective/compassionate leadership empower their associates. Going beyond simple participative management and into world-class competitive organizations where individuals are valued for their leadership/unique creativity.

Mgmt 3111. Fundamentals of Management. (2 cr; QP–CSOM Minor Program student; SP–CSOM Minor Program student; A-F only)

Introduction to organizational analysis/behavior. Structure/functioning of complex organizations. Leadership/management for establishing goals, policies, procedures, and plans. Motivation, culture, organizational design, group dynamics, performance appraisal, negotiation.

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. (4 cr; QP–135 credits; completion of business core courses; SP–90 credits; completion of business core courses; A-F only)

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 4006. Small Business Management. (4 cr; SP–3001, CSOM upper div; A-F only)

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 5050. Management of Innovation and Change. (2 cr; SP-3001, CSOM upper div; A-F only)

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; SP-[4008, Acct 5160] or #; A-F only)

Understanding the structure of business plans. Critically analyzing business plans. Formulating an original business plan.

Marathi (Mar)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Mar 1101. Beginning Marathi. (4 cr; SP-\$3101)

Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Mar 1102. Beginning Marathi. (4 cr; SP-\$3102, 1101 or equiv or #)

Emphasis on developing proficiency in all four language modalities—listening, reading, speaking, and writing.

Mar 3101. Beginning Marathi. (4 cr; SP-\$1101)

Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence.

Mar 3102. Beginning Marathi. (4 cr; SP-\$1102, 3101 or equiv or #)

Emphasis on developing proficiency in all four language modalities—listening, reading, speaking, and writing.

Mar 3131. Intermediate Marathi. (4 cr; SP-1102 or equiv or #)

Speaking and comprehension; development of reading and writing skills based on Marathi-language material.

Mar 3132. Intermediate Marathi. (4 cr; SP-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]; SP-#, Δ, □)

Individualized guided reading or study of modern Marathi texts.

Mar 5994. Directed Research. (3-5 cr [max 12 cr]; SP-#, 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; QP-Econ 1101 or equiv; SP-Econ 1101 or equiv; A-F only)

Introduction to terms, concepts, and skills useful in analyzing marketing problems. Covers factors outside the organization affecting its product, pricing, promotion, and distribution decisions. Utilizes cases from actual organizations and requires a written marketing plan, done individually or as a team.

Mktg 3010. Marketing Research. (4 cr; QP-3000, BA 1550 or equiv; SP-3001, BA 1550 or equiv; A-F only)

Methods for collecting and analyzing data to solve marketing problems. Topics include research design, secondary and primary data collection, sample design, and data analysis.

Mktg 3111. Principles of Marketing. (2 cr; QP-CSOM Business minor student; SP-CSOM Business minor student; A-F only)

Introduction to terms, concepts, and skills useful in analyzing marketing problems. Factors outside the organization affecting its product, pricing, promotion, and distribution decisions. Cases from actual organizations. Written marketing plan, done individually or as a team.

Mktg 4020. Advanced Logistics and Supply Chain Management. (2 cr; QP-3000; SP-3001; A-F only)

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; QP-3000; SP-3001; A-F only)

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; QP-3000; SP-3001; A-F only)

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; QP-3000; SP-3001; A-F only)

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; QP-3000; SP-3001; A-F only)

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; QP-3000; SP-3001; A-F only)

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; QP-3000; SP-3001; A-F only)

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; QP-3000; SP-3001; A-F only)

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; SP-Recommended for [chemical engineering, materials science/engineering] majors; S-N only)

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; QP-2nd year IT (no credit for MatS majors); SP-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; QP-IT lower div honors program; SP-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; QP-Chem 1051, Phys 1253, Math 1261; SP-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; QP-3400, 5011; SP-Grade of at least C in 3011; A-F only)

Structure of metals/alloys. Crystal structure/defects (point defects, dislocations, grain boundaries). Microstructure. Properties of metals, especially mechanical properties.

MatS 3012W. Structure and Mechanical Behavior of Materials. (4 cr; QP-3400, 5011; SP-3011 with grade of at least C)

Structure of crystalline materials. Defects (including point defects, dislocation, and grain boundaries). Role of crystallography/defects in determining mechanical properties. Characterization of crystal structure/defects (using X-ray diffraction, TEM). Behavior of defects during mechanical testing.

MatS 3041. Industrial Assignment I. (2 cr; SP-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; A-F only)

Industrial work assignment in engineering co-op program. Formal written report.

Course Descriptions

MatS 3801. Structural Characterization Lab. (2 cr; QP-5011; SP-Grade of at least C in 3011 or #; A-F only) 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 3851. Materials Properties Lab. (2 cr; QP-5011; SP-Grade of at least C in 3011 or #; A-F only) 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. (3 cr; QP-Math 3261, Chem 5534; SP-Math 2243, Math 2263, upper div IT) 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. (3 cr; QP-MatS 5101, upper div IT or Grad; SP-Upper div IT, Math 2243 and 2263) Mass transport in solids: solid state diffusion, Fick's laws, defects and 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 will be assigned.

MatS 4013. Electrical and Magnetic Properties of Materials. (3 cr; QP-5011, [upper div IT or grad student]; SP-[Grade of at least C in 3011, [upper div IT or grad student]] 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; SP-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; A-F only) 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; QP-5011, 5101, 5102; SP-Grade of at least C in 3011) 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; QP-5011, 3400; SP-Grade of at least C in 3011 or #) Polymer structure-property relations: structure/morphology of crystalline/amorphous state. Crystallization kinetics. Vitrification and the glass transition. Mechanical properties, failure, permeability, optical/electrical properties, polymer composites, effect of processing on properties.

MatS 4221. Materials Design and Performance. (4 cr; QP-MatS 5012; SP-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; QP-MatS 5112 and 5610 or 5630; SP-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; QP-Senior Mat. Sci. major; SP-Senior Mat. Sci. 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 4511W. Corrosion and Electrochemistry of Corrosion. (4 cr; QP-MatS 5011, 5101, upper div IT or grad.; SP-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]; QP-Upper div Mat. Sci.; SP-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]; QP-Upper div Mat. Sci.; SP-Upper div Mat. Sci.) 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]; QP-Upper div Mat. Sci.; SP-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. (4 cr; QP-Chem 3302, 5502; SP-[Chem 2302, 3502] or #; A-F only) Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

MatS 5223W. Polymer Laboratory. (2 cr; QP-5610 or Chem 5610 or #; SP-5221 or Chem 5221 or 8221 or #; A-F only) Synthesis, characterization, and physical properties of polymers. Free radical, condensation, emulsion, anionic polymerization. Infrared spectroscopy/gel permeation chromatography. Viscoelasticity, rubber elasticity, crystallization.

MatS 5521. Thin Films and Interfaces. (3 cr; QP-MatS 5013, upper div IT or grad.; SP-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; QP-MatS 5011, upper div IT or grad.; SP-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; QP-3 yrs high school math or placement exam or grade of at least C- in GC 0631; SP-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 1031. College Algebra and Probability. (3 cr; QP-\$1051, \$1111, \$1151, \$1201; 3 yrs high school math or placement exam or grade of at least C- in GC 0631; SP-\$1051, \$1151, \$1155; 3 yrs high school math or placement exam 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; QP-\$1031, \$1111; 1051 or 1151; SP-\$1031; 1051 or 1151 or 1155; A-F only) For students who need probability/permutations/combinations portion of 1031. Meets with 1031, has same grade/work requirements.

Math 1051. Precalculus I. (3 cr; QP-\$1031, \$1111, \$1201, \$1008, \$1151; 3 yrs high school math or placement exam or grade of at least C- in GC 0631; SP-\$1031, \$1151; 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 1142. Short Calculus. (4 cr; QP-\$1211, \$1251, \$1351, \$1551; 3 1/2 yrs high school math or grade of at least C- in 1031; SP-\$1271, \$1281, \$1371, \$1571; 3 1/2 yrs high school math or grade of at least C- in 1031) Derivatives, integrals, differential equations, partial derivatives, maxima/minima of functions of several variables covered with less depth than full calculus. No trigonometry included.

Math 1151. Precalculus II. (3 cr; QP-\$1008, \$1111, \$1201; 3 1/2 yrs high school math or placement exam or grade of at least C- in 1051; SP-\$1155; 3 1/2 yrs high school math or placement exam or grade of at least C- in 1051) Algebra, analytic geometry, trigonometry, complex numbers, beyond usual coverage found in three-year high school mathematics program.

Math 1155. Intensive Precalculus. (5 cr; QP-\$1031, \$1111, \$1201, \$1008, \$1051, \$1151; 3 yrs high school math or placement exam or grade of at least C- in GC 0631; SP-\$1031, \$1051, \$1151; 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; QP-\$1142, \$1211, \$1251, \$1351, \$1551, 4 yrs high school math including trig or placement test or grade of at least C- in 1151; SP-\$1142, \$1371, \$1571, 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; QP-\$1261, \$1353, \$1552; [1252 or equiv] with grade of at least C-; SP-\$1372, \$1572; [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; QP-\$1142, \$1211, \$1251, \$1351, \$1551; [(four yrs high school math including trigonometry) or [grade of at least C- in 1151] or placement exam], [# or □]; SP-\$1142, \$1371, \$1571; [(four yrs high school math including trigonometry) or [grade of at least C- in [1151 or 1155]] or placement exam], [# or □]; A-F only) Differential calculus of single-variable functions, basics of integral calculus. Applications emphasizing biological sciences.

Math 1282. Calculus with Biological Emphasis II. (4 cr; QP-\$1261, \$1353, \$1552; [(1252 or 1352) with grade of at least C-], [# or □]; SP-\$1372, \$1572; [(1271 or 1281 or 1371) with grade of at least C-], [# or □]; A-F only) Techniques/applications of integration, differential equations/systems, matrix algebra, basics of multi-variable calculus. Applications emphasizing biology.

Math 1371. IT Calculus I. (4 cr; QP-\$1251, \$1551; IT, background in [precalculus, geometry, visualization of functions/graphs], #; familiarity with graphing calculators recommended; SP-\$1271, \$1571; 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; SP-\$1272; 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 1471. Honors Calculus I for Secondary Students. (5 cr; QP-High school student, #; SP-High school student, #) Differentiation/integration of single-variable functions. Emphasizes concepts/explorations.

Math 1472. Honors Calculus II for Secondary Students. (5 cr; SP-1471) Sequences/series, vector functions, differentiation in multivariable calculus. Introduction to first-order systems of differential equations. Emphasizes concepts/explorations.

Math 1571H. Honors Calculus I. (4 cr; QP-\$1271, \$1371; IT Honors office approval; SP-\$1271, \$1371; 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; SP-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; QP-1261 or equiv; SP-1272 or equiv; S-N only) 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; QP-\$3261; 1261; SP-\$2373, \$2573; 1272, 1372, 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; QP-\$3252; 1261 or 1353; SP-\$2373, \$2573; 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; QP-\$3262; 3252 or 3355; SP-\$3283; 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; QP-\$3261; [1253 or 1353], IT; familiarity with graphing calculator recommended; SP-\$2243, \$2573; [1272 or 1372], IT; familiarity with graphing calculator recommended) 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; QP-\$3252; [1261 or 1353], IT; SP-\$2263; [1272 or 1372], 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 2473. Honors Calculus III for Secondary Students. (5 cr; SP-1472) Multivariable integration, vector analysis, nonhomogeneous linear equations, nonlinear systems of equations. Introduction to numerical methods, discrete dynamical systems. Emphasizes concepts/explorations.

Math 2474. Honors Calculus IV for Secondary Students. (5 cr; SP-2473) 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; SP-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; SP-[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; QP-[Grade of at least C- in 1031] or placement exam; SP-[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; QP-Grade of at least C- in 3113, #; SP-Grade of at least C- in 3113, #; A-F only) Probability/Statistics, vector geometry, real/complex numbers. Meets during first half of semester only.

Math 3118. Topics in Elementary Mathematics II. (4 cr; QP-Grade of at least C- in 3113, #; SP-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; QP-\$3262; 3252 or 3261 or 3355; SP-\$2283; 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 4065. Theory of Interest. (3 cr; QP-1252 or 1352 or 1552; primarily for [mathematics, business] majors interested in actuarial science; SP-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 4151. Elementary Set Theory. (3 cr; QP-One soph math course or #; SP-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; QP-\$5162, one soph math course or #; SP-\$5165, one soph math course or #) Propositional logic. Predicate logic: the notion of a first order language, a deductive system for first order logic, first order structures, Godel's completeness theorem, axiom systems, and models of formal theories.

Math 4242. Applied Linear Algebra. (4 cr; QP-1553 or 3261 or 3355; SP-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; QP-1553 or 3261 or 3355; SP-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; QP-1 yr soph calculus; SP-[2243 or 2373 or 2573], [2263 or 2374 or 3574]) 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; QP-#; SP-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; QP-3261 or 3355 or 3551; SP-2243 or 2373 or 2573) Laplace transforms, series solutions, systems, numerical methods, plane autonomous systems, stability.

Math 4567. Introduction to Fourier Analysis. (4 cr; QP-3261 or 3355 or 3551; SP-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; QP-[[3252 or 3355], 3262] or 3552; SP-[[2263 or 2374], [12283 or 13283]] or 3574)

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.

Course Descriptions

Math 4990. Topics in Mathematics. (1-4 cr [max 12 cr]; QP-#; SP-#)

Math 4991. Independent Study. (1-4 cr [max 12 cr]; QP-#; SP-#)

Math 4992. Directed Reading. (1-4 cr [max 12 cr]; QP-#; SP-#)

Math 4993. Directed Study. (1-4 cr [max 12 cr]; QP-#; SP-#)
May be used for CLA senior project.

Math 5067. Actuarial Mathematics I. (4 cr; QP-5056, [one qtr [4xxx or 5xxx] [probability or statistics] course]; SP-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; QP-#; SP-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; QP—Two yrs calculus, basic computer skills; SP—Two yrs calculus, basic computer skills; A-F only)
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; QP—Two yrs of calculus, basic computer skills; SP—Two yrs of calculus, basic computer skills; A-F only)
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; QP—3262 or Phil 5201 or CSci course in theory of algorithms or #; SP—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; QP-#; SP-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; QP—Soph math course; SP—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. Probabilistic algorithms: pseudoprimes, prime factorization. Pseudo-random numbers. Elliptic curves.

Math 5251. Error-Correcting Codes, Finite Fields, Algebraic Curves. (4 cr; QP—Soph math course; SP—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; QP—Soph sequence, #; SP—[[2243 or 2373], [¶2283 or ¶3283]] or ¶3574)
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; QP-#; SP-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; QP—[3251 or 3354 or 3551], [3261 or 3355 or 3552]; SP—[2243 or 2373 or 2573], [¶2263 or ¶2374 or ¶3574])
Advanced two-dimensional Euclidean geometry from a vector viewpoint, including: many 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; QP-#; SP-5335)
Projective geometry, including: relation to Euclidean geometry, finite geometries, fundamental theorem of projective geometry. N-dimensional Euclidean geometry from a vector viewpoint. Emphasizes N³, including: polyhedra, spheres, isometries.

Math 5345. Introduction to Topology. (4 cr; QP—[[3252 or 3355], 3262] or 3552; SP—[[2263 or 2374], [¶2283 or ¶3283]] or 3574)
Set theory. Euclidean/metric spaces. Basics of general topology, including compactness/connectedness.

Math 5378. Differential Geometry. (4 cr; QP—[[3252 or 3355], 3262] or 3552; SP—[[2263 or 2374], [¶2283 or ¶3283]] or 3574)
Basic geometry of curves in the plane and in space, including Frenet formula, theory of surfaces, differential forms, Riemannian geometry.

Math 5385. Introduction to Computational Algebraic Geometry. (4 cr; QP-3251 or 3354 or 3551; SP-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; QP-3261 or 3355 or 3551 or #; SP-2243 or 2373 or 2573 or #)
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; QP—Two yrs calc, familiarity with some programming language; SP—[2243 or 2373 or 2573], [2263 or 2374 or 3574], 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; QP—Two yrs calc, familiarity with some programming language; SP—[2243 or 2373 or 2573], [2263 or 2374 or 3574], familiarity with some programming language)
Topics in industrial math, including color photography, catalytic converters, photocopying.

Math 5485. Introduction to Numerical Methods I. (4 cr; QP-3261 or 3355 or 3551; some computer skills recommended; SP-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; QP-#; SP-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; QP-5242; SP-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; QP-#; SP-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; QP—[[3261 or 3355], 3262] or 3552; SP—[[2243 or 2373 or 2573], [¶2283 or ¶3283]] or ¶3574)
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-Bendixon theory, strange attractors.

Math 5535. Dynamical Systems and Chaos. (4 cr; QP—[[3252 or 3355], 3261 or 3356] or 3552; SP—[2243 or 2373 or 2573], [2263 or 2374 or 3574])
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; QP—\$5553; 3252 or 3355 or 3552; SP-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; QP-1 yr soph calculus; SP—[2243 or 2373 or 2573], [2263 or 2374 or 3574])
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; QP—Full yr soph calculus; SP—[2243 or 2373 or 2573], [2263 or 2374 or 3574]; A-F only)
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; QP-1 yr soph calculus, 3262; SP—[[2243 or 2373], [2263 or 2374], [¶2283 or ¶3283]] or ¶3574)
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; QP-#; SP-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; QP-3252 or 3355 or 3551; SP-Stat 5101; 2263 or 2374 or 2573)

Logical development of probability, some 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; QP-#; SP-5651 or Stat 5101)

Random walks, Markov chains, branching processes, martingales, queuing theory, Brownian motion.

Math 5654. Prediction and Filtering. (4 cr; QP-#; SP-12243 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. Combinatorics A. (4 cr; QP-Soph math course, some linear algebra recommended; SP-Soph math course, some linear algebra recommended)

Basic enumeration, inclusion-exclusion, recurrence relations, generating functions (ordinary and exponential), elementary asymptotics, partitions, trees, listing algorithms, algorithmic matchings, bijections/involutions, Polya theory. Optional topics include extremal set theory, symmetric functions, partially ordered sets.

Math 5707. Combinatorics B. (4 cr; QP-Soph math course; some linear algebra recommended; SP-Soph math course; some linear algebra recommended)

Elementary graph theory, including related algorithms, flows/networks, matching theory, combinatorial optimization. Optional topics include designs, Latin squares, permanents, linear programming, Ramsey theory, coding theory/finite fields, matroids.

Math 5711. Linear Programming and Combinatorial Optimization. (4 cr; QP-Linear algebra; SP-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; QP-IT lower div; SP-IT lower div; A-F only)

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; QP-Upper div ME, A; SP-Upper div ME, 3321, ¶3322; A-F only)

Experimental methods, instrumentation for engineering measurements, statistical estimates of experimental uncertainty, calibration, signal conditioning, selected transducers for mechanical measurements, data acquisition and processing, and presentation of results. Measurement of temperature, pressure, humidity, stress-strain, force, velocity and flow and radiative properties.

ME 3041. Industrial Assignment I. (2 cr; QP-ME upper div, regis in ME co-op; SP-ME upper div, regis in ME co-op program; A-F only)

Industrial work assignment in engineering intern program. Evaluation based on student's formal written report covering the quarter's work assignment.

ME 3221. Design and Manufacturing I: Engineering Materials and Manufacturing Processes. (4 cr; QP-ME upper div, ME 3020, AEM 3016, Chem 1052, Mats 3400, Phys 1253; SP-ME upper div, 2011, AEM 3031, CSci 1113, MatS 2001; A-F only)

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; QP-ME upper div, ME 3020, AEM 3016, Chem 1052, Mats 3400, Phys 1253; SP-Upper div ME student, 3221, CSci 1113 or equiv; A-F only)

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; QP-IT or grad student; SP-ME upper div, AEM 2021, CSci 1113; A-F only)

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; QP-Upper div ME or AEM major; SP-IT student, Chem 1021, Math 2243, Phys 1301; A-F only)

Properties, equations of state, processes and cycles for reversible and irreversible thermodynamic systems. Modes of work and heat transfer. Equations for conservation of mass, linear momentum, energy, and entropy. Mixture properties, thermochemistry, and chemical equilibrium for ideal gases introduced.

ME 3322. Heat Transfer and Fluid Flow. (4 cr; QP-IT upper div or wood and paper sci or grad; SP-ME upper div, 3321; A-F only)

Mechanisms of heat transfer: conduction, radiation, convection, and phase change. Fluid flow: mass and momentum conservation laws, statics, inviscid model and Bernoulli's equation. Convection: external and internal flows, heat transfer coefficient, forced and natural convection, heat exchangers. Phase change: boiling and condensation.

ME 3324. Introduction to Thermal Science. (4 cr; QP-IT upper div or wood and paper sci or grad student; SP-IT student, Chem 1021, Math 2243, Phys 1301; A-F only)

Fundamentals of thermodynamics and heat transfer. Thermal properties of substances. First and second laws of thermodynamics. Steady and unsteady heat conduction. Thermal resistance concept. Convection heat transfer. Radiative heat transfer between solid surfaces. Boiling and condensation heat transfer.

ME 4042. Industrial Assignment II. (2 cr; QP-ME undergrad regis in ME co-op; SP-ME upper div, regis in ME Co-op program; A-F only)

Industrial work assignment in engineering intern program. Evaluation based on student's formal written report covering the quarter's work assignment.

ME 4043. Industrial Assignment III. (4 cr; QP-ME 3742; SP-4042; A-F only)

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; QP-ME upper div, ME 3201, ME 3203, ME 3205, ME 3303, ME 5342, or #; SP-2011, 3031, 3221, 3223, 3321, 3322, AEM 2021, AEM 3031; A-F only)

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; QP-ME upper div, 5254; SP-4054, #; A-F only)

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; QP-Upper div ME honors student, #; SP-Upper div ME honors student, #; A-F only)

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; QP-Upper div ME honors student, #; SP-Upper div ME honors student, #; A-F only)

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; QP-ME upper div, 3701, 3702, 5603 or ¶5603; SP-ME upper div or grad student, 3322 or 3233; A-F only)

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; QP-ME upper div, ME 3201, ME 3701, ME 3702; SP-ME upper div, 3031, 5281; A-F only)

Microprocessor programming, digital filters, frequency response testing, modeling of electromechanical 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; QP-3201, 3702, 5283, ME upper div; SP-3031, 3281, ME upper div; A-F only)

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; QP-ME upper div, 3303, 3701, 3702, AEM 3200, or CE 3400; SP-IT upper div or grad student, 3031, 3321, 3322; A-F only)

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; QP-ME upper div, 3303, 3701, 3702, AEM 3200 or CE 3400; SP-Upper div ME or grad student, C grade or better in 3031, 3321, 3322 or 3324 with #; A-F only)

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; QP-IT upper div or grad student; SP-Upper div IT or grad student, submission of permission form, #)

Topics vary each semester.

ME 5090. Advanced Engineering Problems.

(1-4 cr; QP-Subject to approval of department form; SP-ME upper div, #)

Special investigations in various fields of mechanical engineering and related areas including an independent study project.

Course Descriptions

ME 5101. Vapor Cycle Systems. (4 cr; QP-IT or grad student, ME 3303; SP-IT upper div or grad student; A-F only)

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; QP-IT or grad student, 3303, 5342; SP-IT upper div or grad, 3322 or 3323; A-F only)

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; QP-IT upper div or grad student, ME 3303, ME 5342; SP-IT upper div or grad student, 3322 or 3323; A-F only)

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; QP-IT upper div or grad student, 3303; SP-IT upper div or grad student; A-F only)

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; QP-IT upper div or grad student; SP-IT upper div or grad student; A-F only)

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; QP-IT upper div or grad student, 3303 or #; SP-IT upper div or grad student; A-F only)

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; QP-IT upper div or graduate student, #; SP-IT upper div or graduate student; A-F only)

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; QP-IT or grad student, 5260 or equiv; SP-3221, AEM 3031, CSci 1113, MatS 2001; A-F only)

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; QP-IT upper div or grad student, 5260 or equiv; SP-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; QP-IT upper div or grad student, 3020, AEM 3016, Math 3261, FORTRAN; SP-IT upper div or grad, 3221, AEM 3031, CSci 1113, MatS 2001; A-F only)

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; QP-IT or grad student; SP-ME or AEM upper div or grad student, 5281 or equiv; A-F only)

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; QP-IT or grad student, 3020, 3203, 3205; SP-IT upper div or grad, 3222, CSci 1113 or equiv; A-F only)

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; QP-IT or grad student, 3203 or equiv; SP-Upper div IT or grad, 3222 or equiv, basic kinematics and dynamics of machines; knowledge of CAD packages such as Pro-E helpful; A-F only)

Analytical methods of kinematic, dynamic, and kinetostatic 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; QP-IT upper div or grad student, AEM 3016; SP-AEM 3031, MatS 2001; A-F only)

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; QP-IT or grad student, ME 3201 or equivalent; SP-Upper div IT or grad, 3281)

Apply vibration theory to design; optimize 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; QP-IT or grad student, ME 5283; SP-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; QP-IT or grad student, ME 5283; SP-Upper div ME or AEM or CSci or grad student, 5281 or equiv; A-F only)

Manipulator forward and inverse kinematics, homogeneous transformations and coordinate frames, the Jacobian and velocity control, task primitives and programming, computational issues; determining path trajectories; reaction forces; manipulator dynamics and control; vehicle kinematics, dynamics and guidance. Lab project demonstrates concepts.

ME 5288. Modeling and Simulation of Dynamic Systems. (4 cr; QP-IT or grad student, 5283 or equiv; SP-IT upper div or grad, 5281; A-F only)

Bond graphs as structured methodology for developing unified models of mechanical, electrical, magnetic, fluid, thermal, and hybrid systems. Causality and formulation of state-space equations. Analytical and numerical solution of equations of motion. Multiport fields, rigid body dynamics, and distributed parameter systems.

ME 5341. Case Studies in Thermal Engineering and Design. (4 cr; QP-IT or grad student, 5342; SP-IT upper div or grad student, 3321, 3322; A-F only)

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; SP-3321, 3322, [IT upper div or grad student]; A-F only)

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; QP-IT or grad student, 5342; SP-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; QP-IT or grad student, 5342; SP-IT upper div or grad student, 3322; A-F only)

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; QP-IT upper div or grad student, 3301, 5342 or equiv; SP-SEE 5611, upper div IT or grad student, 3321, 3322 or equiv; A-F only)

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; QP-IT upper div or grad student, CE 3400 or equiv; SP-SChEn 5753, SBMEn 5310, upper div IT or grad student, transport class [3322 or ChEn 5103] or #; A-F only)

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; QP-IT or grad student, 5342 or equiv; SP-Upper div IT or grad student, 3321, 3322; A-F only)

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; QP-IT or grad student, 3301 or equiv; SP-IT upper div or grad student, C or better in 3322 or 3324; A-F only)

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; QP-IT or grad student, 3301 or equiv; SP-Upper div IT or grad student, 3321, 3322; A-F only)

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; SP-Fr; S-N only)
Orientation to the medical technology (clinical laboratory science) profession.

MedT 4064. Introduction to Clinical Immunohematology. (2 cr; SP-#; A-F only)
Principles of blood grouping, antibody identification, compatibility testing, serology, and immunology.

MedT 4065. Introduction to Clinical Immunohematology: Laboratory. (2 cr; SP-#; A-F only)
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; SP-4310, 4311, 4320, 4321; S-N only)
Application of basic methods and techniques in the clinical chemistry lab.

MedT 4085. Applied Clinical Hematology. (2 cr; SP-4251, 4252, 4253; S-N only)
Application of methods and techniques in clinical hematology, morphology, and hemostasis.

MedT 4086. Applied Clinical Immunohematology. (2 cr; SP-4064, 4065; S-N only)
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; SP-4100, 4102; S-N only)
Isolation, identification, and antimicrobial susceptibility testing of clinically relevant microbes (bacteria, fungi, parasites) from patient specimens.

MedT 4089. Specialty Rotation. (1 cr; SP-Completion of MedT preclinical professional courses; S-N only)
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; SP-#)
Individual assignment to a special area of experience in the clinical lab.

MedT 4092. Honors Program: Laboratory Methods. (3 cr; SP-#)
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; SP-One microbiology course with lab, one biochem course; A-F only)
Basic aspects of lab diagnosis of viral, fungal, and parasitic infections. Lecture.

MedT 4102. Principles of Diagnostic Microbiology. (4 cr; SP-One microbiology course with lab, one biochem course; A-F only)
Current techniques used in lab diagnosis of infectious disease; isolating and identifying bacteria and yeasts; antimicrobial susceptibility testing. Lecture and lab.

MedT 4127. Introduction to Management and Education I. (1 cr; SP-#; A-F only)
Basic concepts in management and education.

MedT 4128. Introduction to Management and Education II. (1 cr; A-F only)
Basic concepts in management and education.

MedT 4251. Hematology I: Basic Techniques. (3 cr; SP-Regis MedT or #; A-F only)
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; SP-4251 or CLS 5251; A-F only)
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; SP-4251 or CLS 5251; A-F only)
Theory and application of specific concepts and techniques in hemostasis and coagulation. Lecture and lab.

MedT 4263. Comparative Hemostasis. (1 cr; SP-#; A-F only)
Theory and application of specific concepts and techniques in hemostasis and coagulation.

MedT 4310. Clinical Chemistry I: Lecture. (2 cr; SP-One organic chem course with lab, one biochem course, #; A-F only)
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; SP-One organic chem course with lab, one biochem course, #; A-F only)
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; SP-One organic chem course with lab, one biochem course, 4310 or CLS 5310, #; A-F only)
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; SP-One organic chem course with lab, one biochem course, 4310 or CLS 5310, #; A-F only)
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.

Medicinal Chemistry (MedC)

Department of Medicinal Chemistry

College of Pharmacy

MedC 5185. Principles of Biomolecular Simulation. (3 cr; QP-Chem 5521 or #; SP-Chem 3502 or #)
Molecular simulation for students in medicinal chemistry, pharmaceuticals, 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; SP-Chem; A-F only)
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; QP-#; SP-#; A-F only)
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; QP-Phcl 1009, BioC 5001; SP-MedC grad student or #; A-F only)
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]; SP-One yr work in some area of Middle Ages, reading knowledge of appropriate language, #)
From late antiquity through the end of the 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]; SP-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)

Graduate School

MicE 5309. Biocatalysis and Biodegradation. (3 cr; SP-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.

Microbiology (MicB)

Department of Microbiology

Medical School

MicB 2022. General Microbiology. (2 cr; QP-§Biol 5013, §MicB 5105, §VPB 3101; soph with C avg in courses prereq to major sequence or jr with 10 cr chem, 5 cr biol sci or #; not for biology majors; SP-§VPB 2022; 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; QP-§Biol 5013, §MicB 5105, §VPB 3101; soph with C avg in courses prereq to major sequence or jr with 10 cr chem, 5 cr biol sci or #; SP-§Biol 2032, §VPB 2032; Biol 1002 or 1009, Chem 1022)

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. Includes lab.

MicB 3301. Biology of Microorganisms. (5 cr; QP-§Biol 5013, §MicB 3103, §VPB 3103; BioC 3021 or Biol 5001 or BioC 5331 or #; SP-§Biol 3301; ¶Biol 1002, ¶Chem 2302) or ¶Biol 1009, ¶Biol 3021 or ¶BioC 3021); A-F only) 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; QP-§MicB 5233; 10 cr chem, 5 cr biol sci or #; not open to microbiology majors; does not count toward 16 upper div cr in biology major; SP-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; QP-3101 or 5105 or Biol 5013 or VPB 3103, Biol 5001 or BioC 3021 or BioC 5331, 3 cr genetics; SP-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; QP-§Soil 5606; 3103 or 5105 or Biol 5013 or Soil 5610; SP-§Soil 4121; Biol/MicB 3301; A-F only)

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; QP-Biol 5001 or BioC 3021 or BioC 5331; SP-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 4141. Biology, Genetics and Pathogenesis of Viruses. (3 cr; QP-Biol 5003, Biol 5004 or Biol 5013 or MicB 5105; SP-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; QP-3101 or 5105 or Biol 5013, MicB 5218 or ¶MicB 5218; not open to med students; SP-Biol/MicB 3301 or equiv, Biol/BioC 3021 or BioC 4331, GCB 3022 or Biol 4003 recommended) Genetic basis of microbial pathogenesis. Impact of gene transfer and regulation on the evolution of microbial pathogens and on their capacity to colonize and induce disease. Biochemical and cellular interactions between bacteria and their human hosts.

MicB 4215. Advanced Laboratory: Microbial Physiology and Diversity. (3 cr; QP-5321 or ¶5321 or equiv; SP-4111 or ¶4111; A-F only) 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; QP-5218 or ¶5218, 5232 or ¶5232; SP-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]; QP-#, Δ; no more than 10 cr of [5970, 5990] may count toward major requirements; SP-#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only) 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]; QP-#, Δ; no more than 10 cr of [5970, 5990] may count toward major requirements; SP-#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only) Laboratory or field investigation of selected areas of research.

MicB 4993. Directed Studies. (1-7 cr [max 7 cr]; QP-#, Δ; SP-Cr ar; Biol/MicB 3301, or #, 7 cr of MicB 4993 and/or 4994 may count toward major requirements; S-N only) 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]; QP-#, Δ; SP-Cr ar; Biol/MicB 3301, #, 7 cr max of MicB 4993 and/or 4994 may count toward major requirements; S-N only) Lab or field investigation of selected areas of research.

MicB 5352. Applied Microbial Biochemistry. (3 cr; QP-Biol 3021 or BioC 5331 or MicB 5321, Biol 5013/MicB 5105 or #; SP-§BioC 5352; 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 and Asian and Slavic Languages and Literatures

College of Liberal Arts

MELC 3491. Classical Islamic Civilization. (3 cr; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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; SP-§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 Farukhzad are among the poets whose works are examined.

MELC 3993. Directed Studies. (1-10 cr; SP-#, Δ, □)

MELC 3994. Directed Research. (1-10 cr; SP-#, Δ, □)

MELC 5311. Medieval Sages. (3 cr; SP-§CAS 5311; 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; SP–\$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; SP–\$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; SP–\$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; SP–\$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; SP–#, Δ, □)

MELC 5994. Directed Research. (1-10 cr; SP–#, Δ, □)

Military Science (Mil)

Department of Military Science (Army ROTC)

Student Development

Mil 0101. Military Science I Leadership Lab. (0 cr; SP–Enrollment in Mil 1010; A-F only)

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; SP–Enrollment in 1220; A-F only)

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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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; SP–Enrollment in Basic Course; A-F only)

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; SP–Enrollment in Basic Course; A-F only)

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; SP–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; SP–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; SP–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; SP–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; SP–A)

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; SP–1001 or #)

Speaking and reading demotic Greek. Pattern-practice drill, simple readings, some grammar.

MdGk 1003. Intermediate Modern Greek I. (4 cr; SP–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; SP–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 Neuroanatomy
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; QP–Mortuary science major; SP–Mortuary science major; A-F only)
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; QP–Mortuary science major; SP–Mortuary science major; A-F only)

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; QP–Mortuary science major; SP–Mortuary science major; A-F only)
Funeral home marketing and merchandising, including advertising, promotion, purchasing, and pricing.

Mort 3018. Funeral Practice. (3 cr; QP–Mortuary science major; SP–Mortuary science major; A-F only)
Practices and procedures related to funeral directing, including social, religious, ethical, and cultural issues; event planning; conducting funeral ceremonies; record keeping; computer applications.

Mort 3020W. Funeral Psychology and Counseling. (3 cr; A-F only)
Applied psychological principles helpful in dealing with clients, especially those experiencing emotional crisis. Principles, techniques, and basic helping skills of counseling as applied to the funeral arrangement conference.

Mort 3025. Mortuary and Business Law. (3 cr; QP–Mortuary science major; SP–Mortuary science major; A-F only)
Basic concepts and principles of business law. Review of mortuary law.

Mort 3051. Restorative Art. (2 cr; QP–Mortuary science major; SP–Mortuary science major; A-F only)
Theory and procedures of restorative art.

Mort 3055. Complicated Grief. (3 cr; SP–Working understanding of grief/loss; A-F only)
Issues related to loss, grief, bereavement, traumatology. Complicated bereavement/traumatology, complicated vs. non-complicated loss. Current treatment methods.

Mort 3061. Embalming I. (3 cr; QP–Mortuary science major; SP–Mortuary science major; A-F only)
Organic and biochemistry. Chemical changes in the human body during life, after death, and during chemical preservation. Disinfection, solutions, toxicology, and embalming fluids. Cardiovascular anatomy as it is applied to the practice of embalming dead human bodies.

Mort 3062W. Embalming II. (3 cr; QP–Mortuary science major; SP–Mortuary science major; A-F only)
Theory and procedure of embalming.

Mort 3091W. Independent Study in Funeral Service. (1-3 cr [max 3 cr]; QP–Mortuary science major; SP–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; QP–Mortuary science major; SP–Mortuary science major; A-F only)
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 I Laboratory. (1 cr; QP–Mortuary science major; SP–Mortuary science major; S-N only)
Practices and procedures of embalming in a preparation room setting using dead human bodies.

Mort 3162. Embalming II Laboratory. (1 cr; QP–Mortuary science major; SP–Mortuary science major; S-N only)
Continuation of the embalming laboratory sequence. Students develop and refine embalming techniques and skills using dead human bodies.

Mort 3370. Funeral Service Seminar. (1 cr; QP–Mortuary science major; SP–Mortuary science major; S-N only)
Selected presentations related to topics and issues in funeral service.

Mort 3380. Funeral Service Practicum. (8 cr; QP–Mortuary science major who has completed all other coursework; SP–Mortuary science major who has completed all other coursework; S-N only)
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; SP–#; A-F only)
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; QP–8010; SP–5011 or #; A-F only)
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]; SP–5011, 5012, Δ; S-N only)
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; SP–Music major, concurrent registration in applied music, #, Δ; A-F only)
Preparation for junior recital. Student will be supervised by major applied instructor.

Mus 0951. Senior Recital. (0 cr; SP–Music major, concurrent registration in applied music, #, Δ; A-F only)
Preparation for senior recital. Student will be supervised by major applied instructor.

Mus 1001. Fundamentals of Music. (3 cr; SP–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; SP–\$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; SP–Music major; A-F only)
For freshman music majors with limited keyboard background. Functional skills such as reading, transposing, harmonizing, improvising, and playing by ear, along with keyboard theory, technique, and repertoire.

Mus 1152. Piano: Class Lessons II. (2 cr; SP–Music major; A-F only)
For freshman music majors with limited keyboard background. Functional skills such as reading, transposing, harmonizing, improvising, and playing by ear, along with keyboard theory, technique, and repertoire.

Mus 1155. Keyboard Skills I. (2 cr; SP–Undergrad music keyboard major or #; A-F only)
For freshman keyboard majors and other music majors with extensive keyboard background. Emphasis on reading, transposing, harmonizing, improvising, and playing by ear, along with keyboard theory, technique, and music learning skills.

Mus 1156. Keyboard Skills II. (2 cr; SP–Undergrad music keyboard major or #; A-F only)
For freshman keyboard majors and other music majors with extensive keyboard background. Emphasis is reading, transposing, harmonizing, improvising, and playing by ear, along with keyboard theory, technique, and music learning skills.

Mus 1260. Voice Class. (2 cr [max 4 cr]; SP–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; SP–1471 or #; A-F only)
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; SP–Diagnostic test administered by the School of Music; A-F only)
Study the basics of common-practice tonal harmony and part-writing, the basics of music analysis in a variety of contexts, and the foundations of ear-training and sight singing.

Mus 1502. Foundations of Musical Theory, Analysis, and Ear-Training II. (4 cr; SP–1501 or diagnostic test administered by the School of Music; A-F only)
Study the basics of common-practice tonal harmony and part-writing, the basics of music analysis in a variety of contexts, and the foundations of ear-training and sight singing.

Mus 1801W. Music, Society, and Cultures. (3 cr; A-F only)
Study rural, urban, and tribal musics throughout the world with the interdisciplinary methods of humanities and social sciences. World-wide distribution of musical creativity with audio and 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; SP–Fr or no more than 36 cr; A-F only)

Topics specified in *Class Schedule*.

Mus 1905. Topics: Freshman Seminar. (3 cr; SP–Fr or max 36 cr; A-F only)

Topics specified in *Class Schedule*.

Mus 1907W. Topics: Freshman Seminar. (3 cr; SP–Fr or no more than 36 cr; A-F only)

Topics specified in *Class Schedule*.

Mus 1910W. Topics: Freshman Seminar. (3 cr; SP–Fr or no more than 36 cr; A-F only)

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 to 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. 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]; SP–Jr or sr piano or organ major or #; A-F only)

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]; SP–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; SP–Vocal performance or accompanying major, 2 yrs music theory and music history; A-F only)

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 Mélodie. (1 cr; SP–Vocal music or accompanying major; 2 yrs of music theory and music history; A-F only)

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; SP–Voice or choral music major; concurrent regis in applied voice; A-F only)

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; SP–Voice or choral music major, concurrent regis in applied voice; A-F only)

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; SP–Voice or choral music major, concurrent regis in applied voice; A-F only)

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; SP–Voice or choral music major, concurrent regis in applied voice; A-F only)

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; SP–Music major or #; A-F only)

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; SP–#; A-F only)

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]; SP–Audition, #; A-F only)

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]; SP–Audition, #; A-F only)

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; SP–1152 or #; A-F only)

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; SP–1152 or #; A-F only)

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]; SP–Audition, #; A-F only)

Study and performance of representative vocal jazz literature.

Mus 3401. Basic Conducting. (2 cr; SP–1502, music major; A-F only)

Beginning course in basic conducting techniques and role of the conductor.

Mus 3410. University Wind Bands. (1 cr [max 8 cr]; SP–Audition, #; A-F only)

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]; SP–Audition, #; A-F only)

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]; SP–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]; SP–#; A-F only)

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]; SP–#; A-F only)

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. (4 cr; SP–1501, 1502; A-F only)

Harmony and voice-leading continued. Diatonic and basic chromatic chords; form; analysis of music from the 18th and 19th centuries; ear-training and sight-singing.

Mus 3502. Theory and Analysis of Tonal Music IV. (4 cr; SP–3501 or #; A-F only)

Harmony and voice-leading continued. Chromatic tonal practices. Form, including sonata, rondo, variations, and other standard categories of tonal composition. Analysis of music from the 18th and 19th centuries. Ear-training and sight-singing.

Mus 3508. Review of Tonal Theory. (3 cr; SP–Theory placement exam; A-F only)

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; SP–3501 or 3518 or appropriate score on Ear-Training Placement Exam; A-F only)

Melodic, harmonic, and rhythmic dictation; sight-singing; clef reading. Emphasis on chromatic harmony.

Mus 3518. Review of Ear-Training and Sight-Singing. (1 cr; SP–Theory Placement Exam; A-F only)

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; SP–3532, #; A-F only)

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; SP–1151 or 1155, 1501 or #; A-F only)

History of the European art-music tradition and its social contexts from antiquity to 1700: composers, styles, structures, and social institutions.

Mus 3602W. History of Western Music II. (3 cr; SP–1151 or 1155, 1501 or #; A-F only)

History of the European art-music tradition and its social contexts from 1700 to 1850: composers, styles, structures, and social institutions.

Mus 3603W. History of Western Music III. (3 cr; SP–1151 or 1155, 1501 or #; A-F only)

History of European and American art and popular music traditions from 1850 to the present: composers, styles, structures, and social institutions.

Course Descriptions

Mus 3993. Directed Studies. (1-4 cr [max 10 cr]; SP-#, Δ, □ A-F only)
Guided individual reading or study.

Mus 3995. Major Project. (1 cr; SP-Undergrad music major in B.A. program, Δ, #: A-F only)
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; SP-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 5102. Piano Pedagogy II. (2 cr; SP-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; SP-5102 or grad piano major or #: A-F only)
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; SP-5101 or grad piano major or #: A-F only)
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]; SP-5101-5102 or 5111-5112 or #: A-F only)
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; SP-3502, sr or grad; A-F only)
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; SP-3502, sr or grad; A-F only)
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; SP-12 cr of MusA 1301 or MusA 1401 or #: A-F only)
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; SP-3502, 3603, sr or grad or #: A-F only)
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; SP-3502, 3603, sr or grad or #: A-F only)
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]; SP-Accomp major; A-F only)
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]; SP-French, German and Italian diction, accomp or grad vocal major; A-F only)
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; SP-Grad piano major or #: A-F only)
Literature for piano from late Baroque period to mid-20th century.

Mus 5182. Advanced Piano Literature II. (2 cr; SP-Grad piano major or #: A-F only)
Literature for piano from late Baroque period to mid-20th century.

Mus 5230. Chorus. (1 cr [max 8 cr]; SP-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]; SP-Audition, #: A-F only)
Mixed chorus of about 24 voices. Performances each semester of works for small choirs.

Mus 5241. Vocal Literature I. (3 cr; SP-[12 cr in MusA 1304, grad music student] or #: A-F only)
Vocal literature of major/minor composers from 17th century to present. Structure, style, performance practice.

Mus 5242. Vocal Literature II. (3 cr; SP-12 cr in MusA 1104 or MusA 1304, grad music major or #: A-F only)
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]; SP-Audition, #: A-F only)
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]; QP-Audition, #: SP-Audition, #: A-F only)
Basic techniques of stage movement and acting styles, application to various forms of music theatre.

Mus 5270. Voice Practicum. (1 cr [max 2 cr]; SP-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; SP-12 cr of MusA 1304 or grad music major or #: A-F only)
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; SP-12 cr MusA 1304 or grad music major or #: A-F only)
Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

Mus 5275. Vocal Pedagogy I. (3 cr; SP-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; SP-Sr vocal major or #: A-F only)
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; SP-Music major or #: A-F only)
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; SP-Performance only track: 2 cr per sem; performance/Pedagogy track: 3 cr per sem; [upper div student or grad student], #: A-F only)
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]; SP-Audition, #: A-F only)
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; SP-#: A-F only)
Choral conducting, rehearsal techniques, interpretation of music.

Mus 5284. Choral Conducting I: Gregorian Chant Through Baroque Era. (3 cr; SP-#: A-F only)
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; SP-#: A-F only)
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]; SP-#: A-F only)
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; SP-3502 or #: A-F only)
Beginning techniques of arranging for jazz combo and jazz ensemble; vocal and instrumental.

Mus 5340. Jazz Ensemble. (1 cr [max 6 cr]; SP-Audition, #: A-F only)
A 20-member performing organization covering significant jazz compositions and arrangements written specifically for this medium.

Mus 5341. Jazz Pedagogy. (2 cr; SP-#: A-F only)
Teaching methods of vocal and instrumental jazz improvisation, basic arranging techniques, and jazz history; bibliographies and materials.

Mus 5342. Jazz Theory. (2 cr; SP-3502 or #: A-F only)
Beginning techniques for basic chord construction, extended chords, and nomenclature in jazz idiom.

Mus 5390. Jazz Singers. (1 cr [max 10 cr]; SP-Audition, #: A-F only)
Study and performance of representative vocal jazz literature.

Mus 5410. University Wind Bands. (1 cr [max 8 cr]; SP-Audition, #: A-F only)

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]; SP-Audition, #: A-F only)
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; SP–Violin major or #; A-F only)

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; SP–5421 or #; A-F only)

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]; SP–[[15424 or 15425], grad music student] or #; A-F only)

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; SP–5422 or #; A-F only)

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; SP–5424 or #; A-F only)

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; SP–Grad music student in Violin Performance and Suzuki Pedagogy Program; A-F only)
Research project.

Mus 5427. Violin Pedagogy I. (2 cr; SP–Violin or viola major or #; A-F only)

Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques.

Mus 5428. Violin Pedagogy II. (2 cr; SP–Violin or viola major or #; A-F only)

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]; SP–Audition, #; A-F only)

Study and performance of string orchestra and small chamber orchestra literature.

Mus 5440. Chamber Ensemble. (1 cr [max 8 cr]; SP–Audition, #; A-F only)

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]; SP–#; A-F only)

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; SP–Guitar principal or major or #; A-F only)

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, Izaola, Dodgson, and Brindley.

Mus 5470. Woodwind Chamber Ensemble. (1 cr [max 8 cr]; SP–Audition, #; A-F only)

Chamber music performance using homogeneous or mixed combinations of woodwind instruments.

Mus 5471. Woodwind Literature and Pedagogy I. (3 cr; SP–Music major or #; A-F only)

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; SP–Music major or #; A-F only)

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; SP–Music major or #; A-F only)

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]; SP–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; SP–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; SP–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]; SP–#; A-F only)

Practice and performance of standard and contemporary compositions for percussion instruments in various combinations.

Mus 5491. Percussion Literature I. (2 cr; SP–Jr or sr or grad or #; A-F only)

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; SP–Jr or sr or grad or #; A-F only)

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; SP–3502 or #; A-F only)

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; SP–3502, #; A-F only)

Examine procedures and techniques of music composed since 1945. Integral serialism, sound mass, electronic music, indeterminacy, improvisation, and minimalism in the works of Babbitt, Ligeti, Davidovsky, Oliveros, Cage, Riley, and Reich.

Mus 5541. Counterpoint I. (3 cr; SP–3501, 3511 or #; A-F only)

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; SP–5541; A-F only)

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]; SP–3502 or equiv, 3551 or grad, #; A-F only)

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; SP–3502; A-F only)

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; SP–5561; A-F only)

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; SP–3502; A-F only)

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; SP–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; SP–#; A-F only)

In-depth survey of electroacoustic music repertoire, from tape/analog music through computer-generated compositions. Basic principles of acoustics, electronic sound generation/manipulation, and digital signal processing techniques. Introduction to programming languages for digital sound synthesis. Work with editing software and MIDI applications.

Mus 5592. Digital Music Synthesis and Processing Techniques. (3 cr; SP–5591 or #; A-F only)

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; SP–3502; A-F only)

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. (2 cr; SP–3603; A-F only)

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 5620. Topics in Opera History. (3 cr [max 6 cr]; SP–Grad music major or #; A-F only)

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; SP–3603, 5501 or #; A-F only)

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; SP–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; SP–3603, 5501 or #; A-F only)

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.

Course Descriptions

Mus 5666. Stravinsky. (3 cr; SP-5502, 12 cr music history; A-F only)
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; SP-3603, #; A-F only)

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; SP-1801 or 1804 or music grad or #; A-F only)

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]; SP-#, 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 the prerequisites are (2 cr [max 16 cr]; SP-Δ; A-F only).

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, the prerequisites are (2-4 cr [max 16 cr]; SP-Δ; A-F only).

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] SP—Music major, Δ; A-F only)
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; SP-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 the prerequisites are (2-4 cr; SP-Δ; A-F only).

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 the prerequisites are (2-4 cr [max 16 cr]; SP-Δ; A-F only).

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; SP-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 the prerequisites are (2 cr [max 8 cr]; SP-Δ; A-F only).

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 the prerequisites are (2-4 cr [max 16 cr]; SP-Δ; A-F only).

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 the prerequisites are (2-4 cr [max 24 cr]; SP-Δ; A-F only).

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 the prerequisites are (2 cr [max 8 cr]; SP-Δ; A-F only).

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, unless otherwise noted, the prerequisites are (2-4 cr [max 24 cr]; SP-Δ; A-F only).

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; SP-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; SP–Music ed major; A-F only)
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 3302. Teaching Secondary General Music. (3 cr; SP–Music ed major or #; A-F only)
Methods, materials, curriculum, and principles of learning. Strategies for teaching students in secondary schools to sing, play, create, listen to, and evaluate music. Interdisciplinary connections; the adolescent voice; guitar instruction; applications of technology; peer and field teaching.

MuEd 3350. Student Teaching in Classroom Music. (4-8 cr [max 8 cr]; SP–Music ed major, #; A-F only)
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. (3 cr; SP–Music ed major or music therapy major or #; A-F only)
Development of basic choral conducting skills and rehearsal techniques; diction for singing; repertoire and arranging for various choral ensembles.

MuEd 3416. Choral Conducting and Methods II. (3 cr; SP–Music ed major or #; A-F only)
Development of choral conducting skills and rehearsal techniques; emphasizes interpretation of choral compositions; methods, materials, and curriculum for school choral ensembles; diction for singing.

MuEd 3450. Student Teaching in Vocal Music. (4-8 cr [max 8 cr]; SP–Music ed major, #; A-F only)
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. (3 cr; SP–Music ed major or #; A-F only)
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. (3 cr [max 3 cr]; SP–Music ed major or #; A-F only)
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. (3 cr; SP–Music ed major or #; A-F only)
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. (3 cr; SP–Music ed major or #; A-F only)
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 Music Methods. (3 cr; SP–Music ed major; A-F only)
Techniques for administering a school instrumental music program; emphasis on rehearsal techniques, literature, and materials for school use; school-based experiences; orchestration and arranging.

MuEd 3550. Student Teaching in Instrumental Music. (4-8 cr [max 8 cr]; SP–Music ed major, #; A-F only)
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 3800. Introduction to Clinical Music Therapy Practice. (4 cr; SP–Music therapy major or #; A-F only)
Introduction to lab and field studies of music therapy and music behavior. Pre-internship experiences in health, welfare, recreational, and educational settings.

MuEd 3801. Psychology of Music. (3 cr; SP–Psy 1001 or Psy 3604 or #; A-F only)
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 3804. Applications of Music Therapy I: Music Therapy for Children in Rehabilitative Settings. (4 cr; SP–Music therapy major, #; A-F only)
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; SP–Music therapy major or #; A-F only)
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; SP–Music therapy major or #; A-F only)
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; SP–Music therapy major, #; S-N only)
Six-month resident internship in music therapy at an affiliated, approved hospital or clinic.

MuEd 5011. Music in the Elementary Classroom Curriculum. (2 cr; SP–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; SP—Grad music ed major or #; A-F only)
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; SP—Music or music ed major or #; A-F only)
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; SP—Music or music ed major or #; A-F only)
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; SP—Music or music ed major or #; A-F only)
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 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]; SP—Music ed or music therapy major or grad, #, Δ; A-F only)
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)
Information on curriculum offerings, liberal education requirements, careers in natural resources and environmental fields, summer jobs and internships. Overview of computers and computer-based tools as they apply to natural resource and related coursework. Techniques for information retrieval.

NRES 1002. Freshman Seminar. (1-3 cr; OP—Fr; SP—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)
Global and U.S. population trends. Role of natural resources as raw materials for industry and economic development. Environmental and economic trade-offs associated with raw material gathering, processing, and use. Implications of processing technologies, energy considerations.

NRES 1201. Conservation of Natural Resources. (3 cr; A-F only)
Natural resource conservation and its development in the United States; renewable resources and problems managing them; relationship of natural resource conservation and environmental management to basic ecological principles.

NRES 3000. Colloquium: Natural Resources and Environmental Studies. (1 cr [max 6 cr]; A-F only)
Lectures from experts; readings and discussion of current environmental topics/issues. Topics vary and are announced each semester. Meets with NRES 5000.

NRES 3001. Colloquium: Perspectives on Treaty Rights. (1 cr; A-F only)
Readings and class discussion about the nature of treaty rights reserved by indigenous Americans with respect to utilization of natural resources. Special emphasis on Midwest issues. This web-assisted course meets with NRES 5001.

NRES 3002. Colloquium: Exotic Plants and Animals. (1 cr; A-F only)
Current issues in exotic plants/animals. Lectures from experts, readings, discussion.

NRES 3003H. Honors Colloquium. (1 cr; SP—Fr or soph, CNR honors, #; A-F only)
Lectures from experts. Reading/discussion of current environmental topics/issues.

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; OP—Biol 3008 or EEB 3001 or FR 3104 or equiv; SP—\$5021; Biol 3407 or EEB 3001 or FR 3104 or equiv)
World vegetation management practices, extent, and implications. Emphasis on forest management, agriculture, and agroforestry; historical, current, and prospective practices; environmental and societal implications.

NRES 3051. Experience and Training in a Field Setting. (1-3 cr; OP—#; SP—#; A-F only)
Students provide an oral description and summary of their internship as well as a structured paper or project on a topic related to their experience. Topic is agreed upon in consultation with faculty adviser.

NRES 3061W. Water Quality: Management of a Natural Resource. (3 cr)
Biophysical water quality in the context of today's management concerns. Active learning approaches, and global and ecological perspectives toward understanding the management of surface and groundwater resources.

NRES 3202W. Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships. (3 cr; A-F only)
Theory/practice of leadership/personal effectiveness, planning/conflict management in natural resource/environmental organizations. Readings, case studies, discussions, lectures.

NRES 3205. Field Ecology in NRES. (4 cr; OP—[Biol 1009 or Biol 1201], [Biol 3008 or EEB 3001 or FR 3104 or equiv]; SP—[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, aspects of management. Identification of common plants, animals, soils. Application of field techniques. Field-oriented group problem solving.

NRES 3206. Natural History of Costa Rica. (3 cr; SP—[Biol 1009 or equiv], GPA of at least 2.50, #)
History/culture of Costa Rica. Geology/biogeography of Central America. Volcanism and tropical soils. Tropical marine ecology. Survey of tropical plants, insects, birds, marine invertebrates, and local fauna. Conservation issues. Lectures, seminars, labs, field work, written project.

NRES 3241W. Natural Resource Policy and Administration. (3 cr; OP—ApEc 1101 or Econ 1101; SP—\$5241; ApEc 1101 or Econ 1101)
Basic concepts of political and administrative processes important to natural resource policy and program development. Focus on policy process, participants in policy development, and public programs. Use of case studies.

NRES 3245. Recreation Policy and Landscape-level Planning. (3 cr; OP—Jr or sr; completion of all lower div requirements in RRM; SP—\$5245; jr or sr; completion of all lower div requirements in RRM; A-F only)
Broad themes of recreational land-use policy and planning in the United States. Selected historical and contemporary policy issues. Policy as product of social conflict over use of public resources. Landscape-level planning as means to implement policy and resolve social conflict.

NRES 3261W. Economics and Natural Resources Management. (3 cr; OP—ApEc 1101 or Econ 1101; SP—\$5261; ApEc 1101 or Econ 1101; A-F only)
Economic concepts and tools for natural resources management. Financial and economic valuation, assessment methods, and links to planning and management. Cash flow analysis, benefit cost analysis methods and examples.

NRES 3575. Wetlands Conservation. (3 cr; SP—\$5575)
Freshwater wetland classification, wetland biota, current and historic status of wetlands, and the value of wetlands. National, regional, and Minnesota wetlands conservation strategies and the ecological principles used in wetland management are emphasized.

NRES 3601. Our Home, Our Environment. (3 cr; A-F only)
Affects of people/homes on environment. Design/construction of homes. Reducing negative affects on environment. Sustainable design, construction, use of green materials, energy efficient appliances, maintaining healthy indoor air, conservation.

NRES 4062. Advanced Water Quality. (3 cr; SP—[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.

Naval Science (Nav)

Department of Naval Science (Naval ROTC)

Student Development

Nav 1000. Professional Training in Naval Science. (1 cr [max 1 cr]; QP–Enrolled in NROTC; SP–Fresh enrolled in NROTC; S-N only)

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]; QP–Enrolled in NROTC; SP–Soph enrolled in NROTC; S-N only)

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]; QP–Enrolled in NROTC; SP–Jr enrolled in NROTC; S-N only)

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; QP–1201, 1202, 1203; SP–3301; A-F only)

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.

NRES 4101. Conservation of Plant Biodiversity. (3 cr; A-F only)

Principles underlying measurement/conservation of plant biodiversity at individual, population, community levels. Case studies in management of biodiversity to restore or maintain ecosystem function.

NRES 4195W. Problem Solving in Natural Resources and Environmental Studies. (4 cr; QP–CNR sr [if NRES: 5210, all Rhet courses, 8 cr in area of concentration; if RRM: 5245, FR 5130, FR 5232]; SP–CNR sr [if NRES: 4211, all core courses, 8 cr in area of concentration; if RRM: 3245, FR 4131, FR 4232]; A-F only)

Applying tools/skills in policy, planning, and managerial situations. Working with 'real world' client to produce publishable technical report.

NRES 4200H. Honors Seminar. (1 cr; QP–NRES upper div honors, #; SP–NRES upper div honors, #; A-F only)
Topics presented by faculty, students, guest speakers. Lecture/discussion.

NRES 4211. Survey, Measurements, and Modeling in Natural Resources. (3 cr; QP–[Math 1142 or Math 1251], Stat 3011; SP–[Math 1142 or Math 1271], Stat 3011)
Survey design, data collection/analysis, model development/use. Methods encompass ecological/economic interests.

NRES 4293. Directed Study. (1-5 cr [max 12 cr]; QP–#; SP–#)

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; QP–FR 5130 or #; SP–FR 4131 or #; A-F only)

Application of spatial data inventory and analysis in complex environmental planning problems. Experience with common spatial data collection and database development methods, including GPS, DLG, TIGER, and NWI data, as well as spatial analysis. Topics identified by nonuniversity partners.

NRES 4395. Natural Resources Planning. (4 cr; QP–NRES sr; SP–NRES sr; A-F only)

Natural resource planning for multiple resource uses; techniques and models for evaluating and assessing the trade-offs among alternative management plans. Case studies and laboratory exercises.

NRES 4801H. Honor Research. (2 cr; QP–NRES upper div honors, #; SP–NRES upper div honors, #; A-F only)
Independent research project supervised by faculty member.

NRES 4802H. Honors Research. (2 cr; QP–NRES upper div honors, #; SP–NRES upper div honors, #; A-F only)
Completion of honors thesis. Oral report.

NRES 4811. Natural Resources Interpretation. (3 cr; QP–Jr or sr or grad; SP–Jr or sr or grad; A-F only)

First-hand experience on interpretive talks, self-guided trails, brochure development, exhibit design, and nonformal teaching pedagogy. Master planning and evaluation provides skills for professional interpreters to work in private, state, or federal agencies.

NRES 5000. Colloquium: Natural Resources and Environmental Studies. (1 cr [max 6 cr]; A-F only)

Lectures from experts; readings and discussion of current environmental topics/issues. Topics vary. Meets with 3000.

NRES 5001. Colloquium: Perspectives on Treaty Rights. (1 cr [max 2 cr])

Readings and class discussion about the nature of treaty rights reserved by indigenous Americans with respect to utilization of natural resources. Special emphasis on Midwest issues. This web-assisted course meets with 3001.

NRES 5002. Colloquium: Restoration of Aquatic Systems. (1 cr)

Key concepts/techniques. Common factors in restoration projects. Threats to health of aquatic ecosystems.

NRES 5021. Plant Resource Management and the Environment. (3 cr; QP–Grad; SP–\$3021; grad)

World vegetation management practices, extent, and implications. Emphasis on forest management, agriculture, and agroforestry; historical, current, and prospective practices; environmental and societal implications.

NRES 5061. Water Quality: Management of a Natural Resource. (3 cr; QP–Grad; SP–Grad)

Biophysical water quality in the context of today's management concerns. Active learning approaches, and global and ecological perspectives toward understanding the management of surface and groundwater resources.

NRES 5202. Social Change: Environmental Dispute Resolution, Leadership, and Collaborative Partnerships. (3 cr; QP–Grad student or #; SP–Grad student or #; A-F only)

The philosophy, art, science, practice of leadership; its relationship to management, environmental ethics. Leadership models, traits, behaviors, style, group process. Development of personal leadership philosophy.

NRES 5241. Natural Resource Policy and Administration. (3 cr; QP–ApEc 1101 or Econ 1101, grad or #; SP–\$3241; ApEc 1101 or Econ 1101, grad or #)

Basic concepts of political and administrative processes important to natural resource policy and program development. Focus on policy process, participants in policy development and public programs. Use of case studies.

NRES 5245. Recreation Policy and Landscape-level Planning. (3 cr; QP–Grad or #; SP–\$3245; grad or #; A-F only)

Broad themes of recreational land-use policy and planning in the United States. Selected historical and contemporary policy issues. Policy as product of social conflict over use of public resources. Landscape-level planning as means to implement policy and resolve social conflict.

NRES 5261. Economics and Natural Resources Management. (3 cr; QP–ApEc 1101 or Econ 1101, grad or #; SP–\$3261; ApEc 1101 or Econ 1101, grad or #; A-F only)

Economic concepts and tools for natural resources management. Financial and economic valuation, assessment methods, and links to planning and management. Cash flow analysis, benefit cost analysis methods and examples.

NRES 5575. Wetlands Conservation. (3 cr; QP–Sr or grad or #; SP–\$3575; sr or grad or #)

Freshwater wetland classification, wetland biota, current and historic status of wetlands, and the value of wetlands. National, regional, and Minnesota wetlands conservation strategies and the ecological principles used in wetland management are emphasized.

NRES 5703. Agroforestry: Role in Watershed Management. (2 cr; QP–[Biol 1009 or Biol 1201], [Chem 1001 or Chem 1051]; SP–[Jr or sr or grad student], background in [biological, physical] sciences)

Agroforestry practices, what they are, their intended purpose. Production/watershed protection benefits derived from such practices. Role of agroforestry in sustainable development. Agroforestry examples/case studies presented from North America, developing countries.

Course Descriptions

Nav 4000. Professional Training in Naval Science. (1 cr [max 1 cr]; QP–Enrolled in NROTC; SP–Sr enrolled in NROTC; S-N only)

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; QP–Mgmt 3001; SP–4401; A-F only)

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 5031W. Perception. (3 cr; QP–Psy 3031 or Psy 3051 or #; SP–Psy 3031 or Psy 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.

NSc 5034. Psychobiology of Vision. (3 cr; QP–Psy 3031 or grad or #; SP–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. (3–4 cr; QP–Psy 3031 or #; SP–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; SP–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. Computational Neuroscience II: Neural Systems and Information Processing. (3 cr; QP–Phsl 5201 or equiv, understanding of UNIX; SP–Phsl/NSc 5201 or equiv, understanding of UNIX)

Comprehensive investigation of computational properties of single neurons and locally connected cell networks. Linear cable theory; compartmental modeling of single neuron properties; spatio-temporal interactions between synaptic inputs and neuronal dendritic trees; computational properties of passive and active dendritic spines and spine clusters; quantitative interpretation of whole-cell voltage-clamp data; and dynamics of locally connected cell networks.

NSc 5461. Cellular and Molecular Neuroscience. (4 cr; SP–#)

A contemporary cellular and molecular approach to the study of the nervous system. Includes problem sets designed to teach important physiological concepts and discussion of original research papers. Required for first-year Neuroscience students and appropriate for other graduate students.

NSc 5462. Neuroscience Principles of Drug Abuse. (2 cr; QP–#; SP–#)

Current research on drugs of abuse; their mechanisms of action, characteristics shared by various agents, and neural systems affected by them.

NSc 5481. Invertebrate Neurobiology. (2 cr; SP–\$Ent 5480)

Fundamental principles and concepts underlying cellular bases of behavior and “systems” neuroscience. Particular invertebrate preparations discussed.

NSc 5551. Itasca Cell and Molecular Neurobiology Laboratory. (4 cr; SP–Neuroscience grad or #; A-F only)

Intensive lab introduction to cellular and molecular aspects of research techniques in contemporary neurobiology; held at Itasca Biological Station. Electrophysiological investigations of neuronal properties, neuropharmacological assays of transmitter action, and immunohistochemical studies in experimental preparations.

NSc 5561. Systems Neuroscience. (4 cr; SP–\$5461; A-F only)

Advanced principles of neural systems organization. Lecture/lab.

NSc 5661. Behavioral Neuroscience. (3 cr; QP–Nsc major or minor or #; SP–Nsc major or minor or #; A-F only)

The neural coding and representation of movement parameters, and the neural mechanisms underlying higher order processes such as memorization, memory scanning, and mental rotation. Emphasis on 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; QP–\$Phsl 3101, \$Biol 3101; BioC 3021 or 5331; SP–\$Phsl 3101, \$Biol 3101; Biol/BioC 3021 or BioC 4331)

Basic principles of cellular/molecular neurobiology and nervous systems.

NSci 3102. Introduction to Neuroscience II: Biological Basis of Behavior. (3 cr; QP–\$Phsl 3102, \$Biol 3102; Nsc 3101 or Phsl 3101; SP–\$Phsl 3102, \$Biol 3102; Biol 3101 or Nsc 3101 or Phsl 3101; A-F only)

Organization of neural systems and subsystems underlying the sensory and motor aspects of behavior.

NSci 3102W. Introduction to Neuroscience II: Biological Basis of Behavior. (3 cr; QP–\$Biol 3102, \$Phsl 3102; Nsc 3101 or Phsl 3101; SP–\$Phsl 3102, \$Biol 3102, \$Biol 3102W; Biol 3101 or Nsc 3101 or Phsl 3101; A-F only)

Organization of neural systems/subsystems underlying sensory/motor aspects of behavior. Writing intensive.

NSci 3105. Neurobiology Laboratory I. (1.5 cr; QP–\$Phsl 3105, \$Biol 3105; Nsc 3101 or Phsl 3101 or #; SP–\$Phsl 3105, \$Biol 3105; Biol 3101 or Nsc 3101 or Phsl 3101 or #; A-F only)

Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

NSci 3115. Neurobiology Laboratory II. (1.5 cr; QP–\$Phsl 3115; Nsc 3102 or Phsl 3102 or #; SP–\$Biol 3115, \$Phsl 3115; Biol 3102 or Nsc 3102 or Phsl 3102 or #; A-F only)

Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

NSci 4151. Advanced Topics in Neuroscience. (3 cr; QP–\$Biol 5150, \$Nsc 5150; [Biol 3011, Biol/BioC 3021] or #; SP–\$Phsl 4151; Biol/Nsc/Phsl 3101 or #; A-F only)

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 4185. Itasca Summer Neurobiology Laboratory. (2 cr; SP–#, □ A-F only)

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.

NSci 4793W. Directed Studies: Writing Intensive.

(1–7 cr [max 7 cr]; QP–#, Δ; no more than 10 qtr cr of [5970, 5990] may count toward major requirements; SP–#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only)

Individual study of selected topics. Emphasis on readings, use of scientific literature. Writing intensive.

NSci 4794W. Directed Research: Writing Intensive.

(1–7 cr [max 15 cr]; QP–#, Δ; no more than 10 qtr cr of [5970, 5990] may count toward major requirements; SP–#, Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only)

Lab or field investigation of selected areas of research. Writing intensive.

NSci 4993. Directed Studies. (1–7 cr [max 7 cr]; QP–#, Δ; max of 10 qtr cr of 5970 and/or 5990 may count toward major requirements; SP–#, Δ; max of 7 cr of 4993 and/or 4994 may count toward major requirements; S-N only)

Individual study of selected topics with emphasis on selected readings and use of scientific literature.

NSci 4994. Directed Research. (1–7 cr; QP–#, Δ; max of 10 qtr cr of 5970 and/or 5990 may count toward major requirements; SP–#, Δ; max of 7 cr of 4993 and/or 4994 may count toward major requirements; S-N only)

Lab or field investigation of selected areas of research.

Norwegian (Nor)

Department of German, Scandinavian, and Dutch College of Liberal Arts

Nor 1001. Beginning Norwegian. (4 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. (4 cr; SP–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. (4 cr; SP–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. (4 cr; SP–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 3011. Advanced Norwegian. (4 cr; SP–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; SP–Passing score on GPT)

Discussion of novels, short stories, plays, articles complemented by structural, stylistic, vocabulary-building exercises.

Nor 4001. Beginning Norwegian. (2 cr; SP–\$1001, 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; SP-\$1002, 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; SP-\$1003, 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; SP-\$1004, 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; SP-#) Topics not included in regular courses.

Nurs 3690. Life Span, Growth, and Development I. (2 cr; OP—One general psychology and one general biology course or #; SP—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; OP—3690, one general psychology and one general biology course or #; SP—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; SP-#) Topics not included in regular courses.

Nurs 4000. Introduction to Public Health. (2 cr; SP—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; QP—[5021; SP—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; SP—[4100; A-F only) 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; QP—Nurs student or #; SP—[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; SP—[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; SP—[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; QP—5040; SP—[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; QP—Undergrad in Nurs; SP—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; QP—Nurs honors; SP—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; QP—Undergrad in Nurs; SP—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; SP—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. (2 6 cr; SP—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; SP—4202, [4300, [4306, [4310 or [4200, [4210, [4306) Experience of 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; SP—4205, [4300, [4302, [4310 or [4200, [4210, [4306) A foundation for interpreting the structure and processes of health care delivery including the roles of health professionals. Examine social, economic, technologic, and political factors influencing health care quality, access, and cost. Analyze ethical implications of health resource utilization.

Nurs 4310. Holistic Care of Childbearing Families. (4 cr; SP—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; SP—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; SP—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; QP—Sr undergrad Nurs student, 4104 or #) 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; SP—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; OP—Nurs, honors; SP—4205V) Fundamental skills in systematic inquiry. Interpreting/evaluating research for applicability to nursing practice. Implement study proposed in 4206, write research report to serve as honors research project or thesis.

Nurs 4406. Leadership and Management for Shaping Professional Nursing Practice. (4 cr; QP—5440; SP—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; QP—5440; SP—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; SP—4404H or #) Global health issues examined 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; QP—5140, 5141, 5142; SP—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 4501. Critical Care Nursing Practice. (3 cr; SP—4400, 4401, 4402, 4404, 4406, 4410; A-F only) Participate in the care of critically-ill patients with a nurse preceptor. Synthesize theoretical knowledge and practice skills. Increase competence in evaluating patient data from numerous sources and provide safe, organized care to patients with life-threatening, multi-system problems.

Nurs 4800. Nursing Topics. (1-16 cr [max 16 cr]; QP—#; SP—#) Exploration of a topic to meet individual student needs.

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Nurs 4801. Research Topics. (1-16 cr [max 16 cr]; QP-#; SP-#)

Exploration of research topic to meet individual student needs.

Nurs 5141. Ethical Issues in Health Care of Elders. (3 cr; SP-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]; QP-#; SP-#)

Exploration of research topic to meet individual student needs.

Nurs 5171. SPSS Programming and Data Analysis. (2 cr; QP-Inferential statistics, [[grad or professional] student] or #); SP-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; QP-Grad student, #; SP-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; SP-#)

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; SP-#8242 or #)

Population focused assessment in health planning. Models of assessment for communities, organizations, and other aggregates. Skill development in conducting/analyzing/using assessment in planning population focused interventions.

Nurs 5222. Advanced Physiology. (3 cr; SP-Grad in nurse practitioner or nurse-midwifery, # for undergrads)

Systems approach to human physiology and pathophysiology to focus on physiologic changes across the life span. Emphasis on 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; SP-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; QP-Grad, #; SP-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; QP-#; SP-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; SP-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; SP-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; QP-Nurs grad major; SP-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; QP-Upper div or grad student or #; SP-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. (3 cr; QP-5960, 8040, 8100, 5963 or #5963, #; SP-8100, 8600, 8601, 8241 or #8241, #; A-F only)

Emphasis on knowledge of school health problems, assessment and intervention strategies, integration of research findings, and applications with individuals, families, and communities.

Nurs 5604. Advanced Health Assessment and Interventions with Adolescents. (3 cr; QP-#; SP-CPsy 5303 or equiv or #)

Development of one-on-one health assessment and intervention strategies appropriate for working with teenagers. Integrates knowledge from nursing, public health, health behavior, and adolescent development as a framework for clinical assessment and intervention approaches.

Nurs 5800. Nursing Topics. (1-4 cr; SP-#)

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; QP-Nurs grad student)

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; QP-For undergrad cr: nurs sr or RN; for grad cr: RN with baccalaureate; SP-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.

Nurs 5803. Transcultural Nursing: Theories and Issues. (2 cr; QP-Cultural anth course, nurse undergrad or grad student or RN; SP-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; SP-[Upper div or grad] student in [health sciences or health care]; S-N only)

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 5808. American Indian Health and Health Care. (2 cr; SP-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: Pediatrics Practicum for FNP's. (2 cr; SP-5200, 5222, 5224, 8242, 8402)

Synthesis of research-based nursing assessment/intervention of minor acute/chronic health conditions in primary care population across life span. Synthesis/application of nursing theory/research and of research from related disciplines in evaluation/implementation of safe/effective interventions to promote health, prevent illness. Clinical practicum in pediatric primary care.

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; SP-[Math 1031 or equiv], at least 20 cr; A-F only)

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. (2 cr; A-F only)

Basic concepts, principles, and techniques for managing manufacturing and service operations. Emphasis on decision making in the operations function of organizations. Quantitative and qualitative methods for improving the management of operations stressed. Management students provided with an appreciation of the operations function of organizations.

OMS 3041. Project Management. (2 cr; QP-3000 or #; SP-3000 or #; A-F only)

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. Production and Inventory Management. (4 cr; QP-3000 or #; SP-3001 or #; A-F only)

Concepts and principles related to designing, controlling, and improving production and inventory management systems throughout the supply chain. Topics include capacity planning, inventory planning, production planning, forecasting methods, Material Requirements Planning (MRP), Just-in-Time, and theory of constraints.

OMS 3059. Quality Management. (4 cr; QP-3000 or #; SP-3001 or #; A-F only)

Planning and organizing quality improvement of processes, products and services; quality aspects of product/service design; quality determination cost, customer/vendor relations; process control; quality control; management of improvement process; and organizational assessment of quality. Introduction of concepts relevant to service/manufacturing.

OMS 3111. Introduction to Operations Management. (2 cr; SP–CSOM Minor Program student; A-F only)
Basic concepts, principles, and techniques for managing manufacturing and service operations. Decision making. Quantitative/qualitative methods.

OMS 5170. Simulation Modeling and Analysis. (4 cr; SP–MBA 6120 or BA 1550 or #; A-F only)
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; SP–Otol 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; SP–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]; SP–#)
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; SP–Upper div or #; courses in [biology, biochemistry] recommended; A-F only)
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; SP–Regis dental hygiene program or #; A-F only)
Pharmacology for the dental hygienist. Principles of drug actions.

Phcl 5100. Pharmacology for Nursing Students. (3 cr; SP–[Biochemistry, human physiology] or #; A-F only)
Drug principles, mechanisms of action.

Phcl 5101. Pharmacology for Pharmacy Students. (3 cr; SP–Regis 2nd yr pharmacy student or #; A-F only)
Action/fate of drugs. Lectures, lab.

Phcl 5102. Pharmacology for Pharmacy Students. (2 cr; SP–5101 or #; A-F only)
Action/fate of drugs.

Phcl 5103. Pharmacology for Dental Students. (3 cr; QP–Regis dental student or #; SP–Regis dental student or #; A-F only)
Pharmacological principles/actions of drugs.

Phcl 5109. Problems in Pharmacology. (1-18 cr; QP–Upper div or grad student or #; SP–Upper div or grad student or #)
Research projects and special problems by arrangement.

Phcl 5110. Introduction to Pharmacology. (2 cr [max 2 cr]; SP–Grad student or #; A-F only)
Basic principles of Pharmacology. Focuses on molecular mechanisms of drug action.

Phcl 5462. Neuropsychopharmacology of Abused Drugs. (3 cr; SP–\$Nsc 5208; 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 Practice (Phar)

*Department of Pharmacy Practice
College of Pharmacy*

Phar 1001. Orientation to Pharmacy. (1 cr; S-N only)
The pharmacist's role, issues faced by the pharmacy profession, and information on the University of Minnesota College of Pharmacy

Phar 1002. Health Sciences Terminology. (2 cr; SP–15201)
A self-study course designed to provide students with a working knowledge of terminology used in the Health Sciences.

Phar 5201. Health Sciences Applied Terminology. (2 cr; SP–Phar 1002 or anatomy and physiology)
A self-study course designed to provide students with advanced knowledge of medical terminology and its application in the content of patient medical records and clinical cases.

Phar 5270. Therapeutics of Herbal and Other Natural Medicinals. (2 cr; SP–Organic chem, systems physiology, pathophysiology of disease states, third yr pharmacy student; A-F only)
Herbal products and supplements; interdisciplinary course which will encompass the pharmacology, clinical indications, drug interactions of the most commonly used products today in nontraditional complementary health care. The historical significance as well as evidenced-based role of these products in health care today will be explored. Case studies will help the student understand the clinical application of these products. Designed for practitioners and students in the health sciences.

Phar 5280. Principles of Health Care Counseling. (1 cr; SP–Health Professional Student within Academic Health Center)
Develop counseling skills and apply these skills to the care of patients using simulated counseling exercises.

Philosophy (Phil)

*Department of Philosophy
College of Liberal Arts*

Phil 1001. Introduction to Logic. (4 cr)
Application of formal techniques for evaluating arguments.

Phil 1001H. Honors Course: Introduction to Logic. (4 cr)
Application of formal techniques for evaluating arguments.

Phil 1002V. Honors: Introduction to Philosophy. (4 cr)
Problems. Methods. Schools of philosophy (historical, contemporary).

Phil 1002W. Introduction to Philosophy. (4 cr)
Problems, methods and schools of philosophy; historical and contemporary.

Phil 1003V. Honors: Introduction to Ethics. (4 cr)
Central concepts, principal theories of moral philosophy.

Phil 1003W. Introduction to Ethics. (4 cr)
Central concepts and 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; SP–[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; SP–\$1002)
Central problems and methods of philosophy through culturally diverse texts. Focus will be critical and comparative, reflecting a range of U.S. philosophical traditions.

Phil 1007. Introduction to Political Philosophy Practicum. (1 cr; QP–¶1004; SP–¶1004)
Students are required to do at least two hours a week of community service and connect their service activities in writing to issues discussed in 1004.

Phil 1021. Accelerated Introduction to Logic. (3 cr; SP–\$1001)
Application of formal techniques for evaluating arguments.

Phil 1026W. Philosophy and Cultural Diversity. (3 cr; SP–\$1006)
Central problems/methods of philosophy through culturally diverse texts. Focus is critical/comparative, reflecting a range of U.S. philosophical traditions.

Phil 1910W. Topics: Freshman Seminar. (3 cr; SP–Fr or max 36 cr; A-F only)
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-Socratics, Socrates, Plato, Aristotle, Hellenistic thinkers.

Phil 3005V. Honors: General History of Western Philosophy: Modern Period. (4 cr; SP–\$3005W; 3005, 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)
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 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)
Selected moral problems of private and public life.

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.

Course Descriptions

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; SP-§3302)
Selected moral problems of private/public life.

Phil 3502W. Introduction to Aesthetics. (4 cr)
Development of aesthetic theories with applications to specific aesthetic problems.

Phil 3601W. Scientific Thought. (4 cr; SP—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 3607W. Philosophy of Psychology. (4 cr; SP—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; SP—Honors regis, 6 cr of 3xxx-5xxx philosophy courses)
Topics of contemporary interest varying from semester to semester.

Phil 3910W. Major Seminar. (3 cr; SP—Phil major or #)
Development and presentation of the major project.

Phil 3993. Directed Studies. (1-3 cr; SP—#, Δ, □)
Guided individual reading or study.

Phil 4003. Medieval Philosophy. (3 cr; SP—[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; SP—[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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—3005 or 4231 or #)
Major work (e.g., *Philosophical Investigations*).

Phil 4101W. Metaphysics. (3 cr; SP—One sem history of philosophy or #)
Philosophical theories concerning nature of reality.

Phil 4105W. Epistemology. (3 cr; SP—1001 or #; A-F only)
Theories of nature/sources of knowledge/evidence.

Phil 4231W. Philosophy of Language. (3 cr; SP—[1001, 5201] or #)
Theories of reference, linguistic truth, relation of language/thought, translation/synonymy.

Phil 4310W. History of Moral Theories. (3 cr; SP—1003 or #)
Issues in western moral philosophy from classical age to present.

Phil 4320W. Intensive Study of a Historical Moral Theory. (3 cr; SP—1003 or #)
Intensive consideration of an author or theory in the history of moral or political philosophy.

Phil 4321W. Theories of Justice. (3 cr; SP—1003 or 1004 or #)
Philosophical accounts of concept/principles of justice.

Phil 4324W. Ethics and Education. (3 cr; SP—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. (6 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 4330W. Contemporary Moral Theories. (3 cr; SP—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; SP—1004 or #)
Survey of historical/contemporary works in political philosophy.

Phil 4501W. Principles of Aesthetics. (3 cr; SP—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; SP—3502)
Aesthetic problems that arise in studying or practicing an art.

Phil 4521. Philosophy of Religion. (3 cr; SP—8 cr in philosophy)
Conceptual problems that arise from attempts to provide rational justification for religious belief.

Phil 4605. Space and Time. (3 cr; SP—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; SP—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; SP—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; SP—[[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; SP—One course in philosophy or #)
Mind-body problem. Philosophical relevance of cybernetics, artificial intelligence, computer simulation.

Phil 4622W. Philosophy and Feminist Theory. (3 cr; SP—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; SP—3 [3xxx-5xxx] cr in philosophy or #)
Philosophical problems of contemporary interest. Topics specified in *Class Schedule*.

Phil 4993. Directed Studies. (1-3 cr; SP—#, Δ, □)
Guided individual reading or study.

Phil 5201. Symbolic Logic I. (4 cr; SP—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; SP—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; SP—5201 or #)
Axiomatic and semantic treatment of propositional and predicate modal logics; problems of interpreting modal languages.

Phil 5221. Philosophy of Logic. (3 cr; SP—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; SP—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; SP—# 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; SP—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; SP-3 cr [3xxx-5xxx] in phil or #)
Philosophical problems on contemporary interest. Topics specified in *Class Schedule*.

Phil 5993. Directed Studies. (1-3 cr; SP-#, Δ, □)
Guided individual reading or study.

Physical Education (PE)

School of Kinesiology and Leisure Studies

College of Education and Human Development

PE 1004. Diving: Springboard. (1 cr; QP-[1007 or equiv], #; SP-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)

Fencing 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 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 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; QP-[1053 or equiv], #; SP-1053 or equiv or #)

Offensive/defensive strategies/techniques, goal tending, scrimmage play. Students need their own equipment.

PE 1107. Intermediate Swimming. (1 cr; QP-#; 1007 or equiv; proficient ability to swim 100 meters; SP-#; 1007 or equiv; proficient ability to swim 100 meters)
Intermediate swimming skills. Fundamentals of swimming and hydrodynamics.

PE 1133. Intermediate Foil Fencing. (1 cr; QP-[1033 or equiv], #; SP-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; QP-[1035 or equiv], #; SP-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; QP-#; 1036 or equiv; SP-#; 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; QP-[1038 or equiv], #; SP-1038 or equiv or #)

Review terminology, rules, etiquette. Improve basic skills. Singles/doubles strategy, competitive play.

PE 1154. Figure Skating. (1 cr; QP-[1053 or equiv], #; SP-1053 or equiv or #)

Terminology, rules. Basic moves, jumps, spins. On-/off-ice assignments.

PE 1157. Intermediate Skiing. (1 cr; QP-[1057 or equiv], #; assessment is made to determine skill level; SP-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; QP-[1065 or equiv], #; SP-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; QP-#; 1074 or equiv; SP-#; 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; QP-[1107 or equiv], #; SP-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; SP-[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]; A-F only)
Continuing education after basic SCUBA certification course. Accident prevention,

Course Descriptions

personal safety, SCUBA rescue, recognizing/reducing diver stress. SCUBA Schools International (SSI) Stress and Rescue certification.

PE 1306. Lifeguard Training. (1 cr; QP–Proficiently swim 500 meters, at least 17 yrs old, #; SP–[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; QP–Proficiency in basic strokes, completion of skill/written pre tests, #; SP–[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; QP–1014, [1015 or equiv], #; SP–[1014, [1015 or equiv]] or #)
Develops cardiovascular excellence in lifters. Olympic/traditional lifts. Emphasizes program design, nutrition, and improving speed.

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 5100. Seminar I: Overview of Rehabilitation Science. (2 cr; SP–#; A-F only)

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; QP–One course gen psych, one course abnorm psych; SP–One course gen psych, one course abnorm psych; S-N only)
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 5135. Pathokinesiology. (2 cr; SP–#; A-F only)

Lecture and lab emphasizing anatomical, physiological, and biomechanical aspects of normal and pathological human motion, including analysis techniques.

PMed 5161. Theory of Physical Medicine and Rehabilitation Applied to Medical Sciences. (3 cr [max 3 cr]; QP–Regis OT or PT student or #; SP–Regis OT or PT student or #; A-F only)

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; QP–Regis OT or PT student or #; SP–Regis OT or PT student or #; A-F only)

Neuroanatomic structures as functional systems and basic neurophysiologic concepts with emphasis on applications for understanding and treating physical dysfunctions.

PMed 5215. Clinical Practice of Physical Therapy I. (2 cr; SP–Regis PT student; S-N only)

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; SP–Regis PT student; S-N only)

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. (2 cr; SP–Regis PT student; S-N only)

Third 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 5221. Therapeutic Procedures. (3 cr; SP–Regis PT student; A-F only)

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; SP–Regis PT student; A-F only)

Theory and technique of movement analysis and treatment using electrophysiological testing and therapeutic devices.

PMed 5231. Biomechanics. (3 cr; SP–Regis PT student; A-F only)

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 5255. Clinical Internship I. (3 cr; SP–Regis PT student; S-N only)

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; SP–Regis PT student; A-F only)

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; SP–Regis PT student; A-F only)

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; SP–Regis PT student; A-F only)

Principles of neurophysiology, neurology, motor control, and motor learning as basis for therapeutic intervention in motor dysfunction.

PMed 5283. Musculoskeletal I. (4 cr; SP–Regis PT student; A-F only)

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. (3 cr; SP–Regis PT student; A-F only)

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; SP–Regis PT student; A-F only)

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; SP–Regis PT student)

Assessment and rehabilitation of patients with neurological, immunological, and vascular conditions.

PMed 5290. Administration and Teaching Practicum. (4 cr; SP–Regis PT student; A-F only)

Learning experiences and special assignments related to physical therapy administration.

PMed 5293. Research Design in Physical Therapy. (3 cr; SP–Regis PT student; A-F only)

Predictive research, elementary statistical concepts, analysis of scientific literature, research proposal.

PMed 5294. Independent Study in Physical Therapy. (1-3 cr; SP–Regis PT student; A-F only)

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; QP–Regis OT student or #; SP–Regis OT student or #; A-F only)

Critical thinking, ethics, professional resources/organizations, patient-therapist relationship. Level I fieldwork experience.

PMed 5313. Therapeutic Occupation. (4 cr; QP–Regis OT student or #; SP–Regis OT student or #; A-F only)

Occupational therapy philosophy, history, and frames of reference. Activity analysis applied to purposeful, therapeutic activities for individuals and groups.

PMed 5340. Human Growth and Development. (2 cr; SP–Regis PT student; A-F only)

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 5341. Introduction: Evaluation and Intervention I. (4 cr; QP–5393 or #; SP–5393 or #; A-F only)

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; QP–5300, 5370 or #; SP–5300, 5313 or #; A-F only)

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; QP–5342 or #; SP–5342 or #; A-F only)

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; QP-5343 or #; SP-5343 or #; A-F only)

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; QP-5312 or #; SP-5313 or #; A-F only)

Application of group/team dynamics in diverse professional settings.

PMed 5370. Theory of Occupation. (1 cr; SP-Regis OT student or #; A-F only)

Occupational therapy frames of reference, role of activity, and historical development of profession.

PMed 5375. Community Resources and Health-Care Issues. (2 cr; QP-[5300, 5342] or #; SP-[5300, 5342] or #; A-F only)

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; QP-[5311, 5312] or #; SP-5313 or #; A-F only)

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; QP-[5360, 5375, 5376] or #; SP-[5360, 5375, 5376] or #; A-F only)

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; QP-[5375, 5376] or #; SP-[5375, 5376] or #; A-F only)

The well elderly, school therapy, work-related injuries/industrial rehabilitation. Fieldwork.

PMed 5392. Research in Occupational Therapy. (3 cr; QP-5370 or #; SP-5313 or #; A-F only)

Analysis of scientific literature, development of research proposals.

PMed 5393. Functional Anatomy and Kinesiology. (4 cr; QP-Regis OT student or #; SP-Regis OT student or #; A-F only)

Gross human anatomy emphasizing skeletal, muscular, circulatory, and peripheral nervous systems of the extremities and trunk. Includes cadaver lab prosecutions. Analyzing functional human movement from a biomechanical perspective.

PMed 5394. Orthotics. (3 cr; QP-5341 or #; SP-5341 or #; A-F only)

Analysis, design, and construction of orthotic devices.

PMed 5395. Independent Study in Occupational Therapy. (1-4 cr [max 16 cr]; QP-Regis OT student or #; SP-Regis OT student or #)**PMed 5813. Cardiopulmonary Physical Therapy.** (2 cr; SP-Regis PT student; A-F only)

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; SP-Phys 1031, Phys 1032 or equiv, #; A-F only)

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; QP-One yr high school algebra; SP-One yr high school algebra)

Fundamental principles governing physical world in context of energy/environment. Lab.

Phys 1011. Physical World. (3 cr; QP-One yr high school algebra; SP-One yr high school algebra; A-F only)

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 1012. Elementary Physics. (4 cr; QP-One yr high school algebra; SP-One yr high school algebra, Internet connectivity; A-F only)

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; QP-High school algebra, plane geometry, trigonometry; SP-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; QP-1041; SP-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. (4 cr; QP-High school algebra, high school geometry, high school trigonometry; SP-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.

Phys 1112. Basic Physics II. (4 cr; QP-1041 or equiv; SP-1111 or equiv)

Algebra-based. Work, energy, momentum, collisions, circular motion, universal gravitation, heat, electricity. Systematic approach to problem solving. Experiments.

Phys 1114. General Physics, Transition. (2.67 cr; QP-[High school calculus or Math 1142 or equiv], [high school trigonometry or Math 1008 or Math 1151]; A-F only)

Algebra-based. Work, energy, momentum, collisions, circular motion, universal gravitation, heat, electricity. Systematic approach to problem solving. Experiments.

Phys 1115. General Physics, Transition. (2.67 cr; A-F only)

Algebra-based. Work, energy, momentum, collisions, circular motion, universal gravitation, heat, electricity. Systematic approach to problem solving. Experiments.

Phys 1116. General Physics, Transition. (2.67 cr; A-F only)

Algebra-based. Work, energy, momentum, collisions, circular motion, universal gravitation, heat, electricity. Systematic approach to problem solving. Experiments.

Phys 1201W. Introductory Physics for Pre-Medicine and Biology I. (5 cr; QP-[High school or college] calculus, trigonometry, algebra; SP-[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; QP-1104, 1105; SP-1201)

Fundamental principles of physics. Motion, forces, conservation principles, structure of matter. Applications to electromagnetic phenomena, including optics, atomic structure. Lab.

Phys 1302W. Introductory Physics for Science and Engineering II. (4 cr; QP-1252, [Math 1261 or Math 1353 or Math 1553H]; SP-\$1402, 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; QP-Selection for IT honors or consent of IT honors office; SP-\$1301; 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; QP-Selection for IT honors or consent of IT honors office; SP-\$1302; 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 2201. Introductory Thermal and Statistical Physics. (2 cr; QP-1253, [Math 1261 or equiv]; SP-[1302 or 1402], [Math 2243 or Math 2373 or Math 2573])

Thermodynamics and its underlying statistical nature.

Phys 2303. Introductory Physics for Science and Engineering III. (4 cr; QP-[1253 or 1453], [Math 3261 or equiv]; SP-\$Phys 2403; 1302, [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 20th-century physics such as classical/quantum mechanical waves, optics, special relativity, atomic structure of materials.

Phys 2311. Modern Physics. (4 cr; QP-[1253 or 1453H], Chem 1052, Math 3261; SP-[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 2403V. Honors Physics III. (4 cr; QP-Phys 1453H, selection for IT honors or consent of IT honors office; SP-\$2303, 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 2601. Quantum Physics. (4 cr; QP-1253 or equiv, Math 3261 or equiv; 3254 or 3454H recommended; SP-2303 or 2403, [Math 2263 or Math 2374 or Math 3574])

Introduction to quantum mechanics and selected topics from its application to atomic, molecular, condensed-matter, nuclear, elementary-particle, and statistical physics. Associated lab is 2605.

Phys 2605. Quantum Physics Laboratory. (3 cr; QP-Phys 3512 or Phys 3501; SP-[2601])

Laboratory experiments in atomic, solid state, and nuclear physics offered in conjunction with 2601.

Phys 3071W. Laboratory-Based Physics for Teachers. (4 cr; QP-College algebra; SP-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 3 cr]; QP-IT or CLA upper div honors, #; SP-Upper div honors, #)

Designed to prepare students for senior honors thesis projects and provide guidance in choice of future careers.

Course Descriptions

Phys 3993. Directed Studies. (1-5 cr [max 10 cr]; QP-#, Δ; SP-#, 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]; QP-#, Δ; SP-#, Δ)

Independent, directed study in physics in areas arranged by the student and a faculty member.

Phys 4001. Analytical Mechanics. (4 cr; QP-Math 3261 or equiv; SP-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; QP-5022; SP-4001)

Classical theory of electromagnetic fields using vector algebra and vector calculus.

Phys 4051. Methods of Experimental Physics I. (5 cr; QP-3516 or equiv; SP-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; QP-5122 or #; SP-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; QP-General physics or #; SP-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; QP-3513; SP-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; QP-\$HSci 5924, general physics or #; SP-\$HSci 4111, 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; QP-\$HSci 5925, general physics or #; SP-\$HSci 4121, 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; QP-3513 or equiv; SP-2201, 2601)

Principles of thermodynamics and statistical mechanics. Selected applications such as kinetic theory, transport theory, phase transitions.

Phys 4211. Introduction to Solid-State Physics. (3 cr; QP-5102, 5202 or equiv; SP-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; QP-\$EE 5561, \$Geo 5561; 1253 or 1453; SP-\$Geo 4221; 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; QP-5024 or #; SP-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 4311. Introduction to Nuclear Physics. (3 cr; QP-5101 or equiv; SP-4001)

Survey course for non-specialists and an introductory course for those planning to specialize in nuclear physics. Topics include models of nuclei, interactions between nuclei and between particles and nuclei, tests of conservation laws, fission and fusion, and astrophysical applications.

Phys 4411. Introduction to Elementary Particle Physics. (3 cr; QP-5101 or equiv; SP-4101)

Properties and interactions of the fundamental constituents of nature. Survey for nonspecialists and an introductory course for those intending to specialize in elementary particle physics.

Phys 4501. Experimental Project. (1-5 cr; QP-5123, #; SP-4052, #)

Research project in physics area of contemporary interest. Project must be approved by faculty coordinator before registration.

Phys 4611. Introduction to Space Physics. (3 cr; QP-#, SP-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; QP-5022, 5024 or #; SP-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; QP-5024 or #; SP-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 optics; optical detectors and noise; phenomena in intense coherent radiation including nonlinear effects.

Phys 4811. Introduction to Relativity and Cosmology. (3 cr; QP-5022, 5371 or #; SP-4001, 44411)

The construction of cosmological models directly from general relativity. Focus on the standard big-bang model. The connection between the early universe and particle physics explored in detail. Topics include big-bang nucleosynthesis, baryogenesis, inflation, and dark matter.

Phys 4940H. Senior Honors Seminar. (1 cr [max 3 cr]; QP-IT or CLA upper div honors, #; SP-Upper div honors, #; S-N only)

A seminar for upper division physics majors in the honors program.

Phys 5001. Quantum Mechanics I. (4 cr; QP-[[5102 or equiv], adv calc] or #; SP-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; QP-5151 or equiv; SP-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; QP-5022, 5024, adv calc or #; SP-4001, 4002 or #)

Classical mechanics: Lagrangian and Hamiltonian mechanics, orbital dynamics, rigid body motion, special relativity.

Phys 5012. Classical Physics II. (4 cr; QP-5051; SP-5011 or #)

Classical electromagnetism: electrostatics, magnetostatics, Maxwell's equations, electromagnetic waves, radiation, interaction of charged particles with matter.

Phys 5024. Introduction to Electric and Magnetic Fields—Transitional Course. (2.67 cr; QP-5023; A-F only)

Classical theory of electromagnetic fields using vector algebra and vector calculus. This is a transitional course taught in fall 1999 only. It is open to students who completed Phys 5023 under quarters and need to finish the sequence under semesters.

Phys 5041. Analytical and Numerical Methods of Physics I. (4 cr; QP—Two 5xxx Math courses; SP—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; QP-#, SP-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; QP—Gen physics, #; no cr for physics grad or grad physics minor; SP—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; QP—General phys, calculus; SP-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; QP—General phys, calculus; SP-1302 or 1402)

Signal analysis, medical imaging, medical x-rays, tomography, radiation therapy, nuclear medicine, MRI, and similar topics.

Phys 5101. Solid-State Physics for Engineers and Scientists. (4 cr; QP-1254, 3512, grad or advanced undergrad in physics or engineering or the sciences or #; SP-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; QP-5231 or #; SP-5701 or #)

Diamagnetism and paramagnetism; ferromagnetism and antiferromagnetism; optical phenomena; lasers; superconductivity; surface properties; ferroelectricity.

Phys 5950. Colloquium Seminar. (1 cr; QP—Grad or advanced undergrad in physics, Δ; SP—Grad or advanced undergrad in physics, Δ)

Phys 5980. Introduction to Research Seminar. (1 cr [max 3 cr]; QP—Grad or upper div phys major; SP—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]; QP-#, Δ; SP-#, 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]; QP-Jr, Δ; SP-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; SP—High school chem, high school biol)

How major organ systems function (nerve, muscle, circulation, respiration, endocrine, renal, gastrointestinal, 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; SP—One yr college biol, one 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; SP—One 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; SP—Physiology major, one yr college chem and physics and math through integral calculus; A-F only)

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]; QP—¶college physiology, #; SP—¶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; QP—\$Biol 3101, \$NSc 3101; Biol/BioC 3021 or BioC 5331, Biol 5004 or ¶5004; SP—\$Biol 3101, \$NSc 3101; Biol/BioC 3021 or BioC 4331, Biol 4004 or ¶4004)

Basic principles of cellular and molecular neurobiology and nervous systems.

Phsl 3102. Introduction to Neuroscience II: Biological Basis of Behavior. (3 cr; QP—\$Biol 3102, \$NSc 3102; 3101 or Biol 3101 or NSc 3101; SP—\$Biol 3102, \$NSc 3102; 3101 or Biol 3101 or NSc 3101; A-F only)

Organization of neural systems and subsystems underlying the sensory and motor aspects of behavior.

Phsl 4095. Honors Problems in Physiology. (2-4 cr [max 4 cr]; QP—Phsl 3055, physiology honors candidate, permission of the director of undergraduate studies in physiology; SP—¶3071, physiology honors candidate, permission of the director of undergraduate studies in physiology; A-F only)

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; QP—Biomedical engineering grad, one yr college chem and physics and math through integral calculus; SP—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]; QP—3055, 3056, physiology undergrad, #; SP—#) Independent lab research project in physiology, supervised by physiology faculty.

Phsl 5095. Problems in Physiology. (1-5 cr [max 20 cr]; QP—3055, 3056, physiology undergrad, #; SP—#) Individualized study in physiology. Students address selected problem through library or lab research, supervised by physiology faculty.

Phsl 5201. Computational Neuroscience I: Membranes and Channels. (3 cr; QP—Calculus through differential equations; SP—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;

QP—Understanding of UNIX, Phsl/NSc 5201 or equiv; SP—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. Membrane and Muscle: Biochemistry and Physiology. (3 cr; QP—\$MDBC 5444 \$BioC 5444, \$VPB 5444; 3052 or BioC 3021 or BioC 5331 or #; SP—\$MDBC 5444 \$BioC 5444, \$VPB 5444; 3052 or BioC 3021 or BioC 4331 or #)

Muscle membranes: structures, mechanisms and physiological roles of channels and pumps. Muscle contraction: force generation by actin and myosin.

Plant Biology (PBio)

Department of Plant Biology

College of Biological Sciences

PBio 1212W. Plants and Society. (3 cr; QP—For majors and nonmajors; SP—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; QP—Biol 1103 or Biol 3012; SP—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; QP—Biol 1103 or Biol 3012 or Biol 3812; SP—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; QP—Biol 1103 or Biol 3012 or Biol 3812; SP—\$PBio 4811; 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]; QP—#,Δ; no more than 10 cr of [5970, 5990] may count toward major; SP—#,Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major; S-N only)

Individual study on selected topics or problems. Emphasis on readings, use of scientific literature. Writing intensive.

PBio 4794W. Directed Research: Writing Intensive. (1-7 cr [max 15 cr]; QP—#,Δ; no more than 10 cr of [5970, 5990] may count toward major; SP—#,Δ; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major; S-N only)

Laboratory or field investigation of selected areas of research. Writing intensive.

PBio 4801. Plains and Boreal Flora. (4 cr; QP—Taxonomy course, Δ; SP—Taxonomy course, Δ; A-F only) 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; QP—Biol 1103 or Biol 3012 or Biol 3812; SP—\$PBio 4511; 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. Field work.

PBio 4993. Directed Studies. (1-7 cr [max 7 cr]; QP—#,Δ; 10 cr max of 5970 or 5990 may count toward major; SP—#,Δ; 7 cr max of 4993 and/or 4994 may count toward major; S-N only)

Individual study on selected topics or problems with emphasis on selected readings and use of scientific literature.

PBio 4994. Directed Research. (1-7 cr [max 7 cr]; QP—#,Δ; 10 cr max of 5970 or 5990 may count toward major; SP—#,Δ; 7 cr max of 4993 and/or 4994 may count toward major; S-N only)

Laboratory or field investigation of selected areas of research.

PBio 5109. Current Questions in Fungal Biology. (2 cr; QP—Biol 5003 or GCB 3022; SP—Biol 4003 or GCB 3022; A-F only)

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 5221. Molecular Evolution. (2 cr; QP—Biol 5003 or GCB 3022; SP—Biol 4003 or GCB 3022; A-F only)

Molecular basis of evolutionary change. Current ideas of selection and neutral evolutionary processes. Construction of phylogenies as determined from DNA sequence data. Evolution of multigene families, organelle genomes, novel gene function, and their relationship to development and organismal evolution.

PBio 5301. Plant Genomics. (3 cr; SP—[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; QP—Biol 1103 or Biol 3012 or Biol 3812, Biol 5001 or BioC 3021 or BioC 5331; SP—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; QP—Biol 1103 or Biol 3012 or Biol 3812, BioC 3021 or Biol 5003 or GCB 3022; SP—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.

Course Descriptions

PBIO 5416. Plant Morphology, Development, and Evolution. (4 cr; QP–Biol 1103 or Biol 3012 or Biol 3812; SP–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]; QP–Biol 3012, Biol 5003, ¶IGCB 5034; SP–SPBio 5414; Biol 3002, Biol 4003, GCB 5034 or ¶IGCB 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]; QP–Biol 1103 or Biol 3012 or Biol 3812; SP–Biol 2022 or Biol 3002 or Biol 3007)
In-depth treatment of specialized topics in plant biology.

Plant Pathology (PIPa)

Department of Plant Pathology

College of Agricultural, Food, and Environmental Sciences

PIPa 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.

PIPa 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.

PIPa 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.

PIPa 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.

PIPa 2001. Introductory Plant Pathology for Horticulturalists. (3 cr; QP–Biol 1009 or equiv; SP–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.

PIPa 2002. Management and Control of Field Crop Diseases. (3 cr; QP–Biol 1009 or equiv; SP–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.

PIPa 3001. Plant Disease Biology and Management. (1 cr; QP–Biol 1009 or equiv; SP–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.

PIPa 3002. Air Pollution, People, and Plants: The Science and the Ethics. (3 cr; QP– Biol 1009 or equiv, Chem 1051, 1052; SP– Biol 1009 or equiv, Chem 1021, 1022)
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.

PIPa 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.

PIPa 3090. Research in Plant Pathology. (2-4 cr)
Assignment of special problems to undergraduates desiring opportunity for independent research in plant pathology.

PIPa 4000. Plant Pathology Practicum. (1 cr [max 5 cr]; QP–3001 or 3002, environmental hort majors should be jr or sr; SP–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.

PIPa 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; QP–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; SP–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; S-N only)
Supervised practicum with professional experience in plant pathology and related industries including the Plant Disease and “Dial-U” clinics. Evaluate reports and consultations with faculty advisers and employers.

PIPa 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.

PIPa 5090. Issues in Plant Pathology. (2-4 cr)
See *Class Schedule* or department for current offerings.

PIPa 5102. Epidemiology and Plant Disease Resistance. (3 cr; QP–5201 or equiv; SP–5201 or equiv)
Concepts/methodology in quantitative study of plant disease epidemics and host plant resistance. Disease assessment/analysis in time/space. Models for epidemic progress. Environmental influences on epidemic development. Crop loss assessment. Disease forecasting. Ecology of host-parasite interactions. Development of disease-management strategies.

PIPa 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.

PIPa 5201. Biology of Plant Diseases. (4 cr; QP–Biol 1009 or equiv; SP–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.

PIPa 5202. Field Plant Pathology. (2 cr; QP–#: SP–#)
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.

PIPa 5203. Biology and Ecology of Fungi. (3 cr; QP–Biol 1009 or equiv; SP–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.

PIPa 5204. Plant Disease Management. (3 cr; SP–3001 or 3002; A-F only)
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.

PIPa 5301. Plant Genomics. (3 cr; QP–Intro course in genetics or #: SP–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.

PIPa 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 and Asian and Slavic Languages and Literatures

College of Liberal Arts

Plsh 1101. Beginning Polish. (4 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. (4 cr; SP–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. (4 cr; SP–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. (4 cr; SP–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. (3 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; SP–\$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; SP–\$1001, \$1002; 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)

Examines how American public opinion, political participation, and political institutions are shaped by the mass media and newer media technologies. Explores the historical role of media in American politics and how that relationship has changed over time.

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; SP-Fr or

max 36 cr; A-F only)

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; SP-Fr or

no more than 36 cr; A-F only)

Topics specified in *Class Schedule*.

Pol 1909W. Topics: Freshman Seminar. (3 cr; SP-Fr or

max 36 cr; A-F only)

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]; SP-#, D; A-F only)

Faculty-supervised research related to work in political or governmental organizations.

Pol 3080. Faculty-Supervised Individual Internships.

(4-12 cr [max 15 cr]; SP-#, Δ;

A-F only)

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; SP-9 cr in social sciences or #; A-F only)

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;

SP-§3109; jr, pol sci, honors; A-F only)

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];

SP-§3110; 3109, pol sci, honors; A-F only)

Individual research/writing of departmental honors thesis.

Pol 3210. Practicum. (1-3 cr [max 6 cr]; SP-#)

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. (3-4 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. (3-4 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;

SP-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; SP-§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; SP-§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; SP-§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 3321. Issues in American Public Policy. (3 cr;

SP-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; SP-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;

SP-§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; SP-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; SP-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; SP-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 3739. Politics of Race, Class, and Ethnicity. (3-4 cr;

SP-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; SP-1001 or equiv

or #)

Field study of political organizations, leadership, campaigns. Students arrange work assignments with candidates.

Pol 3766. Political Psychology. (3 cr; SP-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.

(3-4 cr; SP-§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. (0 cr; SP-¶13210, Δ;

A-F only)

Pol 4275. Contemporary Political Thought. (3-4 cr;

SP-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.

Course Descriptions

Pol 4303. American Democracy in Crisis. (3-4 cr; SP-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; SP-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; SP-[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; SP-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; SP-1001 or equiv or #)
See *Class Schedule* for description.

Pol 4315W. State Governments: Laboratories of Democracy. (4 cr; SP-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; SP-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; SP-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; SP-SEAS 4467; 1054 or 3051 or non-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; SP-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. (3-4 cr; SP-SEAS 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. (3-4 cr; SP-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. (3-4 cr; SP-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. (3-4 cr; SP-SLAS 4479; 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; SP-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. (3-4 cr; SP-At least one 1xxx or 3xxx course in pol sci, non-pol 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. (3-4 cr; SP-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; SP-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; SP-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; SP-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 4561. Comparative Legal Systems. (3 cr; SP-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; SP-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; SP-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. (3-4 cr; SP-1001 or equiv or #)
Major factors influencing electoral decisions; political attitude formation and 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; QP-3835 recommended; SP-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; SP-Non-pol sci grad)
Foreign policy decision making beyond the "to serve the national interest" cliché. 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. (3-4 cr; SP-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. (3-4 cr; SP-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. (3-4 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; SP-3835 or non-pol sci grad or #)
Study the politics of international trade and monetary affairs including north-south and east-west relations.

Pol 4900W. Senior Paper. (1 cr; SP-Pol sr, #; A-F only)
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]; SP-#, Δ, □)
Guided individual reading or study.

Pol 5251. Greeks, Romans, and Christians: Ancient and Medieval Political Thought. (4 cr; SP-§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; SP-§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; SP-§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 5441. Environmental Policy. (3 cr; SP-§3441; non-pol-sci grad student or #)
How American political system deals with environmental issues. How third world countries deal with environmental protection/economic growth. How international community deals with global environmental problems.

Pol 5872. Global Environmental Politics. (3 cr; SP-§3872; non-pol sci grads only)
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 forests, seas and other selected issues. International security and the environment.

Portuguese (Port)

*Department of Spanish and Portuguese Studies
College of Liberal Arts*

Port 1101. Beginning Portuguese. (4 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. (4 cr; SP-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. (4 cr; SP-1102 or #)
Speaking and comprehension. Development of reading and writing skills based on Portuguese-language materials.

Port 1104. Intermediate Portuguese. (4 cr; SP-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; SP-[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; SP-[1104, GPT] or 3001)
Speaking, writing. Cultural comparisons, current events. Grammar review. Writing workshops.

Port 3501V. Honors: Foundations of Lusophone Cultures. (3 cr; SP-[3003 or Span 3003], honors: A-F only)
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; SP-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; SP-[3003 or equiv], honors: A-F only)
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; SP-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; SP-3003; A-F only)
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; SP-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 3910. Topics in Lusophone Literatures. (3 cr [max 9 cr]; SP-3003)
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]; SP-§3910; [3501 or 3502 or 3503], honors: A-F only)
Critical reading of 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]; SP-3501 or 3502 or 3503 or 3910)
Guided individual reading or study

Port 5520. Portuguese Literary and Cultural Studies. (3 cr [max 9 cr]; SP-#)
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]; SP-#)
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]; SP-#)
Study of origins and development of Lusophone Africa (Angola, Mozambique, Cape-Verde, Guinea-Bissau, and São Tomé and Príncipe) using literature, cultural and literary criticism, history, sociology) and various media (film, art, music, Internet).

Port 5910. Topics in Lusophone Cultures. (3 cr [max 9 cr]; SP-#)
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]; SP-#)
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]; SP-#)
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]; SP-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]; SP-#, Δ, □)
Graduate-level research in literatures and cultures of the Portuguese-speaking world. Topics vary.

PreMajor Advising (PMA)

*College of Liberal Arts Student Services
College of Liberal Arts*

PMA 1005. Orientation to the Health Sciences. (2 cr; SP-[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.

Psychology (Psy)

*Department of Psychology
College of Liberal Arts*

Psy 1001. Introduction to Psychology. (4 cr; QP-§GC 1281; SP-§GC 1281)
Scientific study of human behavior. Problems, methods, findings of modern psychology.

Psy 1905. Freshman Seminar. (3 cr; SP-Fr or no more than 36 cr; A-F only)
Topics specified in *Class Schedule*.

Course Descriptions

Psy 3005W. Introduction to Research Methods and Statistics. (4 cr; QP-1001; SP-1001; A-F only)

Introduction to basic concepts and procedures in the conduct and evaluation of psychological research. Emphasis on research methods, the use of statistics to inform the description and interpretation of psychological inquiry, and the scientific evaluation of evidence and claims in psychology.

Psy 3011. Introduction to Learning and Behavior. (3 cr; SP-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; QP-1004; SP-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; QP-1001; SP-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; QP-5061; 1001 or Biol 1009; SP-5061; 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; QP-1001; SP-1001)

Major theories, issues, and facts about personality and personality assessment. Review of important historical and contemporary perspectives on human nature and human individuality such as psychoanalysis, humanistic psychology, trait psychology, behaviorism, and evolutionary psychology.

Psy 3135. Introduction to Individual Differences. (3 cr; QP-5135; 3801 or equiv; SP-5135; 3005)

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; SP-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; QP-1001; SP-1001)

Overview of theories and research in social psychology with emphasis on attitudes and persuasion, social judgment, the self, social influence, aggression, prejudice, helping, and applications.

Psy 3301. Introduction to Cultural Psychology. (3 cr; QP-[1001, 1005, 3801] or #; SP-[1001, 3005] or #; A-F only)

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; QP-5604; 1001; SP-5604; 1001)

Diagnosis, classification, etiologies of behavioral disorders.

Psy 3617. Introduction to Clinical Psychology. (3 cr; QP-3604 or 5604; SP-3604 or 5604)

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; QP-1001; SP-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; SP-3005 or 4801 or equiv, 1001 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; QP-1005, 3801, [jr psychology major or sr psychology major]; SP-3005, [jr psychology major or sr psychology major]; A-F only)

Seminar for completing undergraduate major project paper.

Psy 3960. Undergraduate Seminar. (1-5 cr [max 45 cr]; QP-1001; SP-1001)

Current topics in psychology. Topics listed in psychology office.

Psy 3993. Directed Study. (1-6 cr [max 24 cr]; QP-#, Δ, □ SP-#, Δ, □)

Independent reading leading to paper or to oral or written exam.

Psy 3994. Directed Research. (1-6 cr [max 24 cr]; QP-#, Δ, □ SP-#, Δ, □)

Individual empirical project leading to written report.

Psy 3996. Undergraduate Field Study/Internship in Psychology. (1-6 cr [max 12 cr]; QP-1001, #; SP-1001, #; A-F only)

Supervised field work/internship experiences in the community or industry pertinent to formal academic training in psychology.

Psy 4011. Applied Behavioral Psychology. (3 cr; QP-3011 or #; SP-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; SP-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; QP-1005; SP-3005)

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; QP-1001 or #; SP-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; QP-1001, GC 0631 or equiv; SP-3005, honors student or #)

Descriptive and inferential statistics, hypothesis testing, correlation and regression.

Psy 4902V. Honors Project. (1-6 cr [max 5 cr]; QP-Honors, #, Δ; SP-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]; QP-#; SP-#)

Directed Studies. Special area of psychology or a related science.

Psy 4994V. Honors Research Practicum. (4 cr; QP-1005, 3801, honors psych; SP-3005, honors psych)

Practical experience conducting psychological research. Preparation for completion of honors thesis. Instruction in research ethics, practical aspects of conducting psychological research, writing research reports. Assist faculty, advanced graduate students in research.

Psy 4996H. Honors Internship/Externship. (1-6 cr; QP-Honors, #; SP-Honors, #; A-F only)

Supervised internship/externship experience in a community-service or industrial setting relevant to formal academic training/objectives.

Psy 5012W. Psychology of Conditioning and Learning. (4 cr; QP-3011 or 4011 or grad student or #; SP-3011 or 4011 or grad student or #)

Review/evaluation of key questions, methods, theories, data about classical conditioning, instrumental learning, elementary cognitive processes. Emphasizes animal models.

Psy 5013. Laboratory in Conditioning and Learning. (4 cr; QP-[[1005 or grad student], [3011 or 5012]] or #; SP-[[3005 or grad student], [4011 or 5012]] or #)

Exercises exploring forms of animal conditioning/learning. Combines prepared/independent exercises.

Psy 5014. Psychology of Human Learning and Memory. (3 cr; SP-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; QP-[3051 or 5014] [except for honors/graduate students]; SP-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; SP-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; SP-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 5036. Computational Vision. (3 cr; QP-[[3031 or 3051], [Math 1272 or equiv]] or #; SP-[[3031 or 3051], [Math 1272 or equiv]] 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 5036W. Computational Vision. (3 cr; QP-[[3031 or 3051], [Math 1272] or #; SP-[[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; QP-3031 or #; SP-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; QP-[[3061 or NSc 3102], Math 2243] or #; SP-[[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; SP-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; QP-3011 [except for honors/graduate students]; SP-[3005 or #] [except for honors/graduate students])
Theories/experimental evidence in past/present conceptions of psychology of language.

Psy 5061. Biological Psychology. (3 cr; QP-§3061; 1005 or Biol 1009 or #; SP-§3061; 3005 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; QP-3031 or 3051; SP-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; QP-3061 or 5061 or #; SP-3061 or 5061 or #; A-F only)

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; QP-§3101; 5862 or ¶5862, honors or grad; SP-§3101; 3005, honors or grad)

Theories and major issues and findings on personality functioning, personality structure, and personality assessment. A presentation of historically important and currently influential perspectives.

Psy 5121. History and Systems of Psychology. (3 cr; QP-8 cr or 5xxx courses in psychology or equiv or grad or #; SP-6 cr or 5xxx courses in psychology or #)
Survey of the history, methods, and content of modern psychological theory, research, and application. Schools of psychology (e.g., structuralism, functionalism, behaviorism, Gestalt psychology) and central theories of psychology reviewed in their historical and philosophical context.

Psy 5135. Psychology of Individual Differences. (3 cr; QP-[[3801 or equiv], 5862] or #; SP-[[4801 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 5136. Human Abilities. (3 cr; QP-3135 or 5135, 5862 or equiv or #; SP-3135 or 5135, 5862 or equiv or #)

Theory, methods, and applications of research in human abilities. Topics include intelligence, aptitude, achievement, specific abilities, information processing/learning and intelligence, aptitude/treatment interactions, and quantitative measurement issues.

Psy 5137. Introduction to Behavioral Genetics. (3 cr; QP-3135 or 5135 or #; SP-4801 or equiv or #)

Overview of genetic methods for studying human and animal behavior. Emphasis on the nature and origin of individual differences in behavior. Twin and adoption

methods as well as more modern methods like cytogenetics, molecular genetics, and linkage and association studies.

Psy 5138. Psychology of Aging. (3 cr; QP-3801; SP-3005 or equiv)

Theories/findings concerning age-related changes in mental health, personality, cognitive functioning, productivity are reviewed/interpreted within context of multiple biological, social, psychological changes that accompany age.

Psy 5202. Attitudes and Social Behavior. (3 cr; QP-3201 or #; SP-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; QP-3201 or # except for students in honors

sequence and grads; SP-3201 or #; A-F only)
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; QP-3201 or

grad student or #; SP-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; QP-3201 or grad student or #; SP-3201 or grad

student or #; A-F only)
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; QP-3101 or 3201 or honors or grad student or #; SP-

3101 or 3201 or honors or grad student or #; A-F only)
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 Psychology. (3 cr; QP-3801 or #; SP-3005 or #)

Survey of concepts, theories, methods, findings of vocational psychology. History. Individual differences. Vocational development, device, adjustment. Vocational assessment/counseling.

Psy 5604. Abnormal Psychology. (3 cr; QP-§3604;

honors or grad student or #; SP-§3604; honors or grad student or #)
Comprehensive review of psychopathological disorders. Etiology, diagnostic criteria, clinical research findings.

Psy 5606. Clinical Psychophysiology. (3 cr; SP-3005 or

equiv, 3061 or 5061, 3604 or 5604 or #)
How psychophysiological methods such as autonomic and central nervous system recording are used in the study of major psychopathological disorders.

Psy 5701. Organizational Staffing and Decision

Making. (3 cr; QP-3801, 8 cr in psy; SP-[[3005 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; QP-3801, 8 credits in

psychology; SP-[[3005 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 5703. Psychology of Organizational Training and Development. (3 cr; SP-3711, 4801 or equiv or #)

Theories, methods, and research pertaining to improving performance of individuals at work through learning and instruction: training-needs analysis, models of instructional design, aptitude-treatment interactions, measurement of training outcomes, training evaluation, knowledge structures, specific training programs designed for critical training problems.

Psy 5705. Psychology of Work Motivation. (3 cr; QP-3801 or equiv; 3711 or #; SP-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 5862. Psychological Measurement: Theory and

Methods. (3 cr; QP-3801 or equiv, honors or grad or #; SP-4801 or equiv, honors or grad or #)
Types of measurements (tests, scales, inventories) and their construction; theory and measurement of reliability and validity.

Psy 5865. Advanced Psychological and Educational

Measurement. (4 cr; QP-5862 or #; SP-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; QP-1001;

SP-1001, [jr or sr or grad student])
Special class 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 1961W. Personal Leadership in the University. (3 cr; SP-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; QP-ApEc 1101 or Econ 1101; SP-ApEc 1101 or Econ

1101; A-F only)
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; QP-Jr or sr; SP-Jr or sr)

Leadership and leadership capacities; multicultural and multidimensional perspectives. Students examine their views on leadership. Leadership theory/practice; group dynamics/behavior; applying knowledge to practice.

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.

Course Descriptions

PA 4290. Topics in Planning. (1-3 cr [max 12 cr])
Topics in social policy.

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; SP–Sr or #; A-F only)
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. Participants assemble portfolio.

PA 5001. Intellectual Foundations of Public Action. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only)
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; SP–Major in publ aff or publ policy or sci, tech, and environ pol or urban and regional planning or publ hlth or #; A-F only)
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; SP–Major in publ aff or publ policy or sci, tech, and environ pol or urban and regional planning or publ hlth or #; A-F only)
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; SP–Major in [publ aff or publ policy or [sci, tech, and environ policy] or [urban and regional planning] or publ hlth] or #; A-F only)
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. Organizational Analysis, Management, and Design. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only)
Survey course examines challenges facing higher-level managers in public and nonprofit organizations in a mixed economy and democratic republic. Uses lectures and case discussions to explore distinctive features of public and nonprofit management, skills necessary for effective management, and manager's role as a creator of public value.

PA 5012. The Politics of Public Affairs. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only)
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; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only)
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. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only)
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. (3 cr; QP–5011 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–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 #; A-F only)
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. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only)
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. (1.5 cr; QP–5021 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–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 #; A-F only)
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. (1.5 cr; QP–5021 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–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 #; A-F only)
Examines public affairs topics using maximum likelihood estimation approaches.

PA 5034. Community Analysis and Planning Techniques. (1.5 cr; QP–5021 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–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; QP–5021 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–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 #; A-F only)
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; SP–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; SP–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; SP–[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; SP–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; SP–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; QP–ApEc 3001 or equiv; SP–ApEc 3001 or equiv; A-F only)
Organization, delivery, economic analysis, and finance of state and local public services and functions.

PA 5121. Intergovernmental Relations. (3 cr; SP–Grad or #)
Theory/practice of intergovernmental relations in the United States. Historical, political, and economic roles 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; SP–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; SP–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; SP–Grad or #)
Current theory. Review of conflict resolution strategies. Aspects of interpersonal, group, organizational, and systemic conflict.

PA 5132. Mediation Training. (3 cr; SP–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; SP–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; SP–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]; SP–Grad student or #)
Selected topics.

PA 5201W. American Cities I: Population and Housing. (4 cr; SP–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; SP–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; SP–\$Geog 3605, \$Geog 5605; 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; SP–[[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; SP–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; SP–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; QP–Grad student or #; SP–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; SP–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; SP–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; SP–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; SP–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; SP–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]; SP–Grad student or #)
Selected topics.
- PA 5301. Population Methods and Issues for the United States and Third World.** (3 cr; SP–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; SP–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]; SP–Grad student or #)
Topics in advanced policy analysis methods.
- PA 5401. Poverty, Inequality, and Public Policy.** (3 cr; SP–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; SP–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; SP–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; SP–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; SP–[[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; SP–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; SP–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.** (1-3 cr [max 9 cr]; SP–Grad student or #)
Selected topics.
- PA 5501. Economic Development I.** (2 cr; SP–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; QP–[[5502 or equiv], grad student or publ hlth student or adult spec student] or #; SP–[[5501 or equiv], grad student] or #; A-F only)
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; SP–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.** (3 cr; QP–[[5021 or equiv], [5502 or equiv], [grad student or publ hlth student or adult spec student]] or #; SP–[[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; QP–[5011, [5502 or equiv], [grad student or publ hlth student or adult spec student]] or #; SP–[[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; SP–[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]; SP–Grad student or #)
Selected topics.
- PA 5601. Survey of Women, Law, and Public Policy in the United States.** (3 cr; SP–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.** (3 cr; QP–[5010, [grad student or publ hlth student or adult spec student]] or #; SP–[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]; SP–Grad student or #)
Selected topics.
- PA 5701. Science and State.** (3 cr; SP–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; SP–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; SP—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; SP—[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]; SP—Grad or #) Selected topics.

PA 5801. U.S. Foreign Policy: Process and Analysis. (3 cr; SP—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; SP—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; SP—[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. (1-3 cr [max 9 cr]; SP—Grad student or #) Selected topics.

PA 5901. Computer Applications in Public Affairs. (0.5-3 cr [max 6 cr]; SP—Grad student or #; 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; SP—International HHH fellow; S-N only)

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; SP—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; SP—#)

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];

QP—International Hubert H. Humphrey Fellows; SP—International Hubert H. Humphrey Fellows; S-N only) 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]; SP—Grad student or #) General topics in public policy.

Public Health (PubH)

School of Public Health

PubH 3001. Personal and Community Health. (2 cr; QP—\$3004, \$GC 3114; SP—\$3004)

Fundamental principles of health conservation and disease prevention.

PubH 3003. Fundamentals of Alcohol and Drug Abuse. (2 cr; QP—\$3004, \$5003; SP—\$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; QP—\$3001, \$3003, \$GC 3114; SP—\$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 3091. Practicum in Peer Education I. (2 cr;

QP—Upper div student with demonstrated hlth sci or hlth ed interests, 3001 or ¶3001 or 3004 or ¶3004, #; SP—Upper div student with demonstrated hlth sci or hlth ed interests, 3001 or ¶3001 or 3004 or ¶3004, #; A-F only) 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;

QP—Upper div student with demonstrated hlth sci or hlth ed interests, 3001 or ¶3001 or 3004 or ¶3004, #; SP—Upper div student with demonstrated hlth sci or hlth ed interests, 3001 or ¶3001 or 3004 or ¶3004, #; A-F only) 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 3099. Topics in Public Health. (1-15 cr [max 15 cr]; QP—#; SP—#)

Directed instruction, including selected readings.

PubH 3310. Epidemiology: Science, Methodology, and Application. (2 cr; QP—#; SP—#)

Scientific work from perspective of epidemiology. Overview of scientific inquiry. Introduction to epidemiology, its methodology, and its problems.

PubH 5003. Fundamentals of Alcohol and Drug Abuse. (1.5 cr; QP—\$5023; ed student or #; SP—\$5023; ed student or #)

Lecture, discussion, and special readings on scientific, sociocultural, and attitudinal aspects of alcohol and other drug abuse problems; emphasizes incidence, high risk populations, prevention, and intervention.

PubH 5010. Public Health Interventions for AIDS. (3 cr; QP—Upper div or grad student or professional school student or #; SP—Upper div or grad student or professional school student or #)

Survey of HIV infection from public health perspective. Emphasizes intervention.

PubH 5017. Culture and Health Behavior. (2 cr;

QP—Grad or professional school student or #; SP—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 5030. Prevention of High-Risk Behavior Among Adolescents. (2 cr; QP—[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; SP—[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; A-F only)

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; QP—Che major or #; SP—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; QP—[5414 or 5450 or equiv], [5806 or 5852 or equiv],

[che or pub hlth nutr major or #]; 5420 recommended; SP—[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; QP—Upper div or grad student or professional school student or #; SP—Upper div or grad student or professional school student or #)

Concepts, attitudes, ethics, and lifestyle management related to dying, death, grief, and bereavement. Emphasizes preparing community health and helping professionals/educators for educational activities in this area.

PubH 5049. Legislative Advocacy Skills for Public Health. (3 cr; QP—5398, #; SP—5398, #; A-F only)

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; QP—Che major or #; SP—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; QP—Che major or #; SP—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; SP—Hlth sci professional school student or hlth sci or soc work or pub affairs grad student or #)

Extent and causes of social inequalities in health; degree to which our 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 5061. Community Health Education in Health Care Settings. (2 cr; SP—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 5085. Internship in Health Education Practice II. (1-10 cr; QP—Che major or #; SP—Che major, #)

Supervised health education internship in a health or public health setting under academic/professional supervision. Applying community health education knowledge/skills to health issues/problems.

PubH 5103. Exposure to Environmental Hazards. (2 cr; QP—Eh major or #; SP—Eh major or #; A-F only)

Nature, effects, and regulation of exposure to biological, physical, and chemical hazards in the environment, placing them in context of inter- and multi-disciplinary scientific field of environmental health as an essential component of wider field of public health.

PubH 5104. Environmental Health Effects:

Introduction to Toxicology. (2 cr; QP-Eh or #; SP-Eh or #; 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; QP-Eh major or #; SP-Eh major or #; A-F only)

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; QP-Pub hlth or grad or honors undergrad student or #; SP-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; QP-Pub hlth or grad student or #; SP-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; QP-Pub hlth or grad student or #; SP-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]; QP-5194 or 5120, 5320, #; SP-5194 or 5120, 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; QP-Eh major or #; SP-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; QP-Basic course in [epi, biostats]; SP-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; QP-Eh major or #; SP-Eh major or #)

Guided evaluation of potential health and safety problems at the work site, recommendations and design criteria for correction, and evaluation of occupational health and safety programs.

PubH 5160. Physiological Disposition of Xenobiotics. (2 cr; QP-One course in biochem, mol biol, org chem or #; SP-One 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; QP-General environ toxicology course; SP-General environ toxicology course; A-F only)

In-depth introduction to laws (and associated regulations) of U.S. federal regulatory agencies, such as CPSC, EPA, FDA, OSHA, and DOT, that both require and use toxicological data/information in their mission of protecting human and environmental health.

PubH 5170. Introduction to Occupational Health and Safety. (3 cr; QP-Eh or #; SP-Eh or #)

Introduction to major concepts/issues in occupational health/safety. Application of public health principles/decision-making process in preventing injury/disease, promoting health of adults, and protecting worker populations from environmental hazards. Observational visit to manufacturing facility.

PubH 5171. Properties, Behavior, and Measurement of Airborne Contaminants. (3 cr; QP-[Eh major, [industrial hygiene specialty or equiv]] or #; SP-[Eh major, [industrial hygiene specialty or equiv]] or #; A-F only)

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; QP-Eh major, 5170 or #; SP-Eh major, 5170 or #)

Recognition, evaluation, and control of occupational health and 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; QP-Eh major, [industrial hygiene specialty or equiv or #]; SP-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; QP-[Eh major, [industrial hygiene specialty or equiv]] or #; SP-[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; SP-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 5180. Environmental Microbiology. (4 cr; QP-MicB 3103 or equiv or #; SP-MicB 3103 or equiv or #)

Survival, dissemination, significance, and monitoring of microbes in the human environment. Principles of biological safety, including risk assessment, lab design and operation, lab animals, shipping and transport, and sterilization, disinfection, and decontamination.

PubH 5190. Environmental Chemistry. (3 cr; QP-One course each in gen chem, org chem or #; SP-One 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 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; QP-Pub hlth student or #; SP-Pub hlth student or #)

The field, current issues, and principles and methods of environmental and occupational health practice.

PubH 5202. Special Topics in Environmental and Occupational Health. (1-2 cr)

Selected readings and discussion of problems in environmental and occupational health taught through the Midwest Center for Occupational Health and Safety Institute.

PubH 5220. Introduction to Occupational Safety. (1 cr)

Emphasis on developing a practical foundation in industrial safety. Safety program development and management; roles of OSHA/Workers' Compensation.

PubH 5240. Introduction to Occupational Epidemiology. (2 cr)

Basic epidemiologic principles and methods; emphasis on evaluation of health effects of occupational exposures. Exposure assessment, study design and application, measures of disease occurrence and association, sources of bias in studies, and causal inference.

PubH 5270. Survey of Industrial Hygiene. (2 cr)

For non-industrial hygienists. Overview of science and art of recognizing, evaluating, and controlling health hazards in the workplace.

PubH 5272. Introduction to Health Risk Assessment. (1 cr)

Fundamental steps in risk assessment; emerging trends and advances in the field.

PubH 5273. Ventilation Control of Occupational Hazards. (2 cr; S-N only)

Designing, modifying, testing, and troubleshooting local exhaust systems.

PubH 5320. Fundamentals of Epidemiology. (3 cr; QP-Pub hlth or grad student or #; SP-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; QP-Epi major or #; SP-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; QP-Che or epi major or #; SP-Che or epi major or #; A-F only)

Theoretical perspective on etiology/modification of health behavior in individuals/communities.

PubH 5334. Human Behavior II. (2 cr; SP-[5333, Epi grad student in behavioral track] or #; A-F only)

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; QP-Epi major or #; SP-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.

Course Descriptions

PubH 5336. Advanced Seminar in Infectious Disease Epidemiology. (1 cr [max 2 cr]; QP-5330, 5335, #; SP-5330, 5335, #; S-N only)

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; QP-5330, 5340, 5335, [EPI or MPH or EPI] grad student, #; A-F only)

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; QP-5330, 1 biostats course or #; SP-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; QP-[5240, 5330, 5450, epi MPH major] or #; SP-[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; QP-Epi grad student or postdoc student or #; SP-Epi grad student or postdoc student or clin res student or #; S-N only)

Focuses on NIH-type grants. Mechanics of grant development/writing, principles of informed consent, budget development, grant-review process, identifying funding sources.

PubH 5351. Molecular Epidemiology. (2 cr; SP-PubH 5330, at least one college-level general biology course, [Epi MPH or Epi grad student or #]; A-F only)

Introduction to molecular epidemiology. Sample collection, processing, methodology. Biomarkers used in cancer, cardiovascular disease, and infectious epidemiologic studies.

PubH 5365. Epidemiology of Aging. (2 cr; SP-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; QP-Eh or epi grad major or pub hlth or biol or dent or nurs grad or med school or pharm student or #; SP-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; QP-Epi major or #; SP-Epi major or #; S-N only) Students present their MPH master's projects and give and receive feedback. Projects should be either underway or near completion.

PubH 5381. Genetic Epidemiology. (3 cr; QP-5330, 5450 or equiv, college coursework in genetics, hlth sci grad or professional school student or #; SP-5330, 5450 or equiv, college coursework in genetics, hlth sci grad or professional school student or #)

Etiology, distribution, and control of diseases in groups of relatives; inherited causes of disease in populations. Associations (case-control family studies), concordance (twin studies), disease transmission (segregation analysis), gene localization (gene mapping), and applications in studies of disease etiology.

PubH 5383. Pathobiology of Human Diseases. (3 cr; QP-Pub hlth or biol or dent or eh or epi or nurs or pharm or med school or grad student or #; SP-Pub hlth or biol or dent or eh or epi or nurs or pharm or med school or grad student or #)

Basic cell biology and pathology of human diseases, including cardiovascular, cancer neurodegenerative, immunologic, and infectious diseases. Current concepts of pathobiology, risk factors, and markers described for each disease.

PubH 5384. Human Physiology. (3 cr; QP-Epi major or pub hlth nutr major or #; SP-Epi major or #)

Basic human physiologic, chemical, and biologic principles. Emphasizes homeostasis as unifying concept. Cellular, organ, and organ systems function. Health applications, "clinical" problem solving. Physiologic information presented as background knowledge for critically assessing biologic research.

PubH 5386. Public Health Aspects of Cardiovascular Disease. (2 cr; QP-[5330, 5450] or equiv; SP-[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; QP-5330, 5340, hlth sci grad and professional school student or #; SP-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; QP-5330 or #; SP-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 5390. Smoking Intervention. (2 cr; QP-[Che or epi MPH] or epi grad student or #; SP-[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 5393. Design and Analysis of Group-Randomized Trials in Epidemiology. (3 cr; QP-5340, 5452, epi MPH or epi grad major, #; SP-5340, 5452, epi MPH or epi grad major, #)

Community, school-based, and work site trials and trials involving randomization of other identifiable groups to study conditions. Experimental and quasi-experimental designs and threats to their validity.

PubH 5394. Mass Communication and Public Health. (2 cr; SP-[Pub hlth 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 5395. Obesity and Eating Disorders. (2 cr; QP-Grad or professional school student or #; SP-Grad or professional school student or #)

Definition, measurement, and prevalence; social, behavioral, physiological causes; health consequences; treatment, prevention.

PubH 5398. Public Health Policy as a Prevention Strategy. (2 cr; QP-[Epi or che or pub hlth nutr MPH or epi] grad student or #; SP-[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 5414. Biostatistical Methods I. (3 cr; QP-\$5450; pub hlth or hlth sci grad student or #; SP-\$5450; 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; SP-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. Statistical Computing I: Using Statistical Packages. (1 cr; QP-5450 or ¶5450, hlth sci grad student or #; SP-5450 or ¶5450, hlth sci grad student or #)

Use of the statistical computer package SAS for analysis of biomedical data. Data manipulation, description, and basic statistical analyses (t-tests, chi-square, simple regression).

PubH 5421. Statistical Computing II: Advanced Computational and Graphical Methods. (2 cr; QP-5465, C or FORTRAN or #; SP-5465, C or FORTRAN or #)

UNIX-workstation-based computing and graphical methods for biostatistical analysis. Linear systems, numerical integration and differentiation, optimization, Monte Carlo methods, design and analysis of simulation studies. Familiarity with a programming language (preferably C or FORTRAN) is assumed.

PubH 5450. Biostatistics I. (4 cr; QP-[[Math 1111 or Math 1201], hlth sci grad student] or #; SP-[[Math 1111 or Math 1201], hlth sci grad student] or #)

Descriptive statistics. Gaussian probability models, point/interval estimation for means/proportions. Hypothesis testing, including t, chi-square, non-parametric tests. Regression/correlation. ANOVA. Health science applications using output from statistical packages.

PubH 5452. Biostatistics II. (4 cr; QP-[5450, competence in SAS through 5420] or equiv or grade of at least B in 5414-5415; SP-[5450, competence in SAS through 5420] or equiv or grade of at least B in 5414-5415)

Multiple regression, analysis of counted data, including contingency table analysis, logistic regression. Survival analysis, including Cox proportional hazards regression model. Health science applications using SAS system.

PubH 5456. Proseminar for the Biostatistician. (2 cr; QP-5466, biostats major or #; SP-5466, biostats major or #)

Professional roles and responsibilities of the practicing biostatistician as consultant and collaborator in health sciences research.

PubH 5462. Clinical Trials: Design, Implementation, and Analysis. (3 cr; QP-5452 or 5466 or #; SP-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. Biostatistical Inference 1. (4 cr; QP-\$5450-5452; Stat 5101 or ¶Stat 5101, biostats major or #; SP-\$5450-5452; Stat 5101 or ¶Stat 5101, biostats major or #)

Exploratory data analysis using SAS and S+, ANOVA, classical non-parametrics, multiple comparisons, power and sample size determinations, ANCOVA, simple linear regression, ANOVA as regression, robust regression.

PubH 5466. Biostatistical Inference II. (4 cr; QP-\$5450-5452; Stat 5102 or ¶Stat 5102, biostats major or #; SP-\$5450-5452; 5465, Stat 5102 or ¶Stat 5102, biostats major or #)

Regression analysis based on least squares and maximum likelihood, implemented in SAS and S+. Basics of linear algebra and matrix notation. Estimation interactions, regression diagnostics. Contingency tables; logistic regression; analysis of matched and unmatched case-control and cohort studies.

PubH 5605. Reproductive and Perinatal Health. (2 cr; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #; A-F only)

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; QP–Pub hlth or grad student or #; SP–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; QP–Pub hlth or grad student or #; SP–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; QP–Pub hlth or grad student or #; SP–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; QP–Pub hlth or grad student or #; SP–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; SP–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; SP–Public health student or grad student or #; S-N only)

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 5630. Research Methods in the Health Assessment of Women and Children. (2 cr; QP–Pub hlth or grad student, 5330 or ¶5330 or #; SP–Pub hlth or grad student, 5330 or ¶5330 or #; A-F only)

Elements essential for evaluating and conducting research on health of women and children, including hypothesis generation, development of study design, variable operationalization and measurement, selection of analytic models, and dissemination of results.

PubH 5631. Program Evaluation in Maternal and Child Health. (2 cr; QP–\$5852; 5623 or 5806 or #, mch or pha major or #; SP–Research course, mch or pha major or #)

Introduction to models and applications of program evaluation in public health; design strategies and methods for collecting and analyzing evaluative information; and consideration of social context and ethical and political forces that shape evaluation design, implication, and utilization.

PubH 5633. Qualitative Research Methods. (2 cr; QP–Pub hlth or grad student, 5806 or 5631 or #; SP–Pub hlth or grad student, 5806 or 5631 or #)

Overview of qualitative methods used in research and evaluation; emphasis on public health issues of children, youth, families, and communities.

Understanding the application of qualitative methods and developing data analysis skills.

PubH 5634. Advocating for Change for Children. (2 cr; QP–Pub hlth or grad student or professional in [pub hlth or ed]; SP–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; QP–Grad or professional school student or professional in hlth-related discipline preferred; SP–Grad or professional school student or professional in hlth-related discipline preferred)

Current issues and controversies around prevention and how it relates to health services. History, prevention as an idea, terminology, lifestyle intervention, programs and legislative issues, education, roles and implications for societal action.

PubH 5640. Public Health and Medical Care Organization. (2 cr; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #)

Structure and operation of public health and medical care systems in the United States; determinants of community health and characteristics of successful interventions, particularly with high risk children, youth, and families.

PubH 5645. Families and Health: An Ecosystems Approach. (2 cr; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #)

Interrelationships between individual, family, and community health. Family theories and research and the impact of the sociocultural context, public policies, and community structures on health. Primary and secondary prevention strategies for promoting family health.

PubH 5650. Teenage Pregnancy and Parenting: Models for Intervention. (1 cr)

Understanding adolescent pregnancy, parenting, and sexual decision making from developmental and public health perspectives. Critical examination of best prevention practices, programs and policies for individual counseling, school-based interventions, youth-serving community organizations, and government.

PubH 5651. Critical Reading of Scientific Literature in Adolescent Health. (1 cr; QP–Pub hlth or grad student, 5414 or 5450 or equiv or #; SP–Pub hlth or grad student, 5414 or 5450 or equiv or #)

Critical examination of empirical research in adolescent health across disciplines. Enhances skills in understanding theory, methods, measurement, sampling design, statistical analysis, structure of research articles, peer review process, and ethical responsibilities of researchers in reporting research findings.

PubH 5654. Adolescent Sexual Identity: Teen Risk and Professional Responsibility. (1 cr; QP–Professional in pub hlth or medicine or ed or soc work or counseling or youth service; SP–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; QP–Baccalaureate degree or employment in ed or hlth or soc service field; SP–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; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #)

Introduces students to principles of community organizing and identifies challenges and strategies for public health professionals engaged in community organizing. Decreasing barriers to community

participation; encouraging leadership; building coalitions and alliances; sustaining community organizing efforts.

PubH 5663. Cross-Cultural Health Issues. (2 cr; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #) Health issues and “health culture” of ethnic communities in Minnesota, including Hmong, Hispanic, African American, and Native American. Cultural factors that influence health and health services.

PubH 5693. Grant Writing for Public Health. (1 cr; QP–Mch or pha major or #; SP–Mch or che or pubh nutr or epi major 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 5700. Foundations of Public Health Administration Practice. (2 cr; QP–Pha major or #; SP–Pha major or #)

Planning, organization, and administration of public health agencies at the state level; how these agencies function in relation to public health at federal and local levels. Interaction with practicing public health administrators and specialists.

PubH 5701. Public Health Administration. (2 cr; QP–Pha major or #; SP–Pha major or #)

Issues, administrative problems, activities, structure, organization, supervision, and direction of state, local, federal, and nonprofit public health agencies.

PubH 5702. Policy Issues in Public Health Administration. (2 cr; QP–Pha major or #; SP–Pha major or #)

Policy development and implementation in public health-related agencies and organizations.

PubH 5705. Community Health Assessment. (2 cr; QP–Grad epi course, pha or mch major or #; SP–Grad epi course, pha or mch major or #)

Increases knowledge, understanding, and skills in two of the three core functions of public health: health assessment and assurance. Lectures, group activities, and individual presentations.

PubH 5711. Public Health Law. (2 cr; QP–Pub hlth student or #; SP–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 5720. Management Communication. (2 cr; QP–Pha major; SP–Pha major)

Role of communication in health services administration. Emphasis on development of skills in presentational speaking, interviewing, and written communications. Case study analysis of communication problems in public health organizations.

PubH 5729. Seminar on Medical Ethics. (2 cr; SP–4xxx or 5xxx ethics course or #)

Patients’ rights/duties, informed consent, confidentiality, ethical issues in medical research, initiation/termination of medical treatment, euthanasia, abortion, maternal/fetal conflicts, allocation of medical resources.

PubH 5731. Public Health Program Planning and Grant Writing. (3 cr; QP–Pha or mch major or #; SP–Pha or mch major or #)

Provides knowledge and skills necessary for planning health promotion and disease prevention programs and writing grants to fund these programs. Uses PRECEDE-PROCEED Model as a framework for program planning.

PubH 5733. Interventions for Health of Populations. (3 cr; QP–\$Nurs 8040; 5330 or #; SP–\$Nurs 8601; 5330 or #)

Synthesis of life cycle developmental approach and public health perspective with nursing and behavior change conceptual models to develop intervention models that are effective in addressing priority public health problems across the life span.

Course Descriptions

PubH 5735. Public Ethics/Politics and Public Health. (2 cr; QP-Pub hlth or grad student or #; SP-Pub hlth or grad student or #)

Systematic examination of ethical/value aspects related to decision making in public health interventions. Responsibilities of the state in relation to health, politics as public ethics, and distributive justice in a pluralistic society.

PubH 5740. Organizational Behavior. (2 cr; QP-Pha major or #; SP-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 5742. Ethics in Public Health: Practice, Policy, and Research. (2 cr; SP-Public health or grad student or #)

Basic skills of ethical analysis. Recognizing, researching, analyzing issues arising in public health and in public health research.

PubH 5743. Ethics in Health Care Administration. (2 cr; QP-Pha major or MHA or #; SP-Pha major or MHA or #)

Ethical perspectives in managing health-care organizations, components of decision-making framework, applying framework to selected ethical issues, institutional mechanisms for dealing with ethical problems.

PubH 5751. Principles of Management in Health-Services Organizations. (2 cr; QP-Grad or professional school student; SP-Grad or professional school student) Lectures, case studies on the role of health-care services administrators, principles of management and the administrative process.

PubH 5759. Health-Care Financial Management (Private Sector Emphasis). (3 cr; QP-5756, 5757, pha major or MHA student or #, knowledge of computerized spreadsheets; SP-5756, 5757, pha major or MHA student or #, knowledge of computerized spreadsheets)

Basic principles of corporate finance and selected insurance concepts integrated and applied to health care with private sector emphasis. NPV; CAPM; capital and operating budgets; Medicare PPS and RBRVS; risk-adjusted capitation; health-care reform.

PubH 5771. Health-Care Financial Management (Public Sector Emphasis). (3 cr; QP-3-cr college-level accounting course or #; knowledge of computerized spreadsheets recommended.; SP-2-cr college-level accounting course or #; knowledge of computerized spreadsheets recommended.)

Basic principles of finance and selected insurance concepts integrated and applied to health care with public sector emphasis. NPV; public financing; capital and operating budgets; Medicare PPS and RBRVS; risk-adjusted capitation; health-care reform.

PubH 5790. Sociology of Medicine and Health Care: An Introduction to Medical Sociology. (3 cr; QP-\$Soc 5855; SP-\$Soc 5855)

Social and psychological components of health and medical care. Organization and delivery of health-care services, their problems and perspectives; focus on patient, care provider, and environment within which health-care services are dispersed.

PubH 5801. Principles of Research and Program Evaluation. (4 cr; QP-Pub hlth or grad student or #; SP-Pub hlth or grad student or #)

Introduction to research in public health, including formulation of research question, methodological design, sampling designs, data collection techniques, instrument validity and reliability, role of statistical analysis, and ethics.

PubH 5806. Principles of Public Health Research. (2 cr; QP-Pub hlth or grad or professional school student or #; SP-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; QP-Pha or hsrp&a major or MHA student or #; SP-Pha or hsrp&a major or MHA student or #; A-F only)

Development and organization of HMOs; risk sharing; provider contracts; utilization management; quality improvement; marketing and new product development; employer relations; Medicare and Medicaid contracting; budgeting; financial performance; pricing; regulation.

PubH 5852. Program Evaluation in Health and Mental Health Settings. (3 cr; QP-#; SP-#)

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; QP-Microecon theory course or #; SP-Microecon theory course or #; A-F only)

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-Benefit, Cost-Effectiveness, and Decision Analysis in Health Care. (3 cr; QP-Intermediate econ course; SP-#; 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; SP-Intro crse in [epidemiology or health services research methods], #)

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 5870. Survey Research and Sample Design in Health-Services Research. (2 cr; A-F only)

General, technical, and theoretical context of survey research in health-services research. Survey and sample design issues, with extensive use of case examples.

PubH 5871. Managing Health Information. (3 cr; SP-Grad student or public health student or #)

Sources/types of health information, their quality. Relational database methods for organizing/using information. SAS/SQL skills necessary to manage information data.

PubH 5893. Economics of the Health-Care System. (3 cr; QP-Microecon theory course or #; SP-Microecon theory course or #; A-F only)

Economic analysis of U.S. health-care sector, emphasizing problems of pricing, production, and distribution. Health-care services as one factor contributing to nation's health.

PubH 5894. Health-Services Policy. (2 cr; QP-Pha or hsrp&a major or MHA or pub aff student or #; SP-Pha or hsrp&a major or MHA or pub aff student or #)

Social, political, and economic context within which U.S. health-care system developed; influence of these contextual elements on public policies guiding and regulating organization and delivery of health services.

PubH 5900. Public Health Nutrition: Principles and Programs. (2 cr; QP-Pub hlth nutr major or #; SP-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; QP-3xxx nutr course or equiv or #; SP-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; QP-Jr or sr or grad or professional school student; SP-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 5906. Field Experience: Public Health Nutrition. (1-8 cr [max 10 cr]; QP-Pub hlth nutr major; SP-Pub hlth nutr major; S-N only)

Placement in an approved agency with opportunity for experience in nutrition-related activities of public health programs.

PubH 5907. Assessment of Dietary Intake. (1 cr; QP-Pub hlth nutr major or #; SP-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; QP-5450 or 5414 or equiv, grad or professional school student; SP-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 5910. Critical Review of Research in Public Health Nutrition. (1 cr; QP-Pub hlth nutr or mch major, grad-level course each in research, biostats, epi or #; SP-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; QP-Grad or professional school student, 5450 or 5414 or equiv or #; SP-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; QP-Grad or professional school student or #; SP-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 5920. Public Health Aspects of Nutrition Policy. (2 cr; QP-Pub hlth nutr or che or epi MPH or epi or nutr grad major or #; SP-Pub hlth nutr or che or epi MPH or epi or nutr grad major or #)

Nutrition policy formulation and effects on public health. Role of policy approaches in context of nutrition; how these approaches differ from other prevention strategies.

PubH 5932. Nutrition: Adults and the Elderly. (2 cr; QP-Grad or professional school student or #; SP-Grad or professional school student or #; A-F only)

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; QP-5330, FScN 5622 or MdBc 5201 or equiv or #; SP-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; QP–Grad or professional school student or #; SP–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.

Recreation, Park, and Leisure Studies (Rec)

*School of Kinesiology and Leisure Studies
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; QP–1520 or #; SP–1501 or #; A-F only) 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; QP–[1520 or #], rec major; SP–[1501 or #], rec major; A-F only) 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; QP–3530, 3546 or #; Rec major; SP–3541 or #; Rec major; A-F only) Principles and practices of financing and managing leisure service agencies in the public and private sector.

Rec 3601. 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]; QP–Rec sr or #; SP–Rec sr or #; S-N only) 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]; QP–Rec major or #; SP–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; QP–MEd or grad student or #; SP–MEd or grad student or #; A-F only) 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; QP–\$Kin 5111; Kin or rec major or #; SP–\$Kin 5111; Kin or rec major or #; A-F only) Steps in planning and building facilities for athletics, physical education, and sport for college, professional, and public use.

Rec 5161. Recreation Land Policy. (3 cr; QP–1500 or 5100 or #; SP–1501 or 5101 or #; A-F only) 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; QP–3550 or #; SP–3551 or #; A-F only) Scope and development of profit-oriented recreation agencies, including an emphasis on the tourism industry.

Rec 5211. Introduction to Therapeutic Recreation. (3 cr; QP–1520 or #; SP–1501 or #; SP–1501 or #; A-F only) 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 5221. Comprehensive Therapeutic Recreation Services Development and Management. (4 cr; QP–5210 or #, rec major; SP–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. Recreation and Persons With Developmental Disabilities. (3 cr; QP–5210 or #; SP–5211 or #; A-F only) Issues relating to leisure services for persons with developmental disabilities; approaches to programming, including behavioral methods, in home, school, and community settings.

Rec 5241. Functional Intervention: Recreation Therapy in Geriatric Care. (3 cr; SP–3541 or 5111 or #; A-F only) 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; QP–1520, rec major, or #; SP–1501, rec major, or #; A-F only) 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; QP–3150; 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 5461. Foundations of Sport Management. (3 cr; QP–\$Kin 5460; kin or rec major or #; SP–\$Kin 5461; kin or rec major or #; A-F only) 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; QP–\$Kin 5510; SP–\$Kin 5511; A-F only) Critically examines women's involvement in/ contributions to sport, physical activity, and leisure.

Rec 5801. Legal Aspects of Sport and Recreation. (4 cr; QP–3550 or #; SP–\$Kin 5801; 3551 or 5461 or #; A-F only) 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; QP–\$Kin 5980; MEd or grad student or #; SP–\$Kin 5981; MEd or grad student or #; A-F only) 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]; QP–MEd or grad student or #; SP–#) 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]; QP–MEd or grad student or #; SP–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.

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; SP–\$3034, \$JwSt 1034, \$JwSt 3034; 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; SP–\$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.

Course Descriptions

RelA 1182. Honors Course: Jesus in History. (3 cr; SP-\$1082)

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 1082.

RelA 3013W. Biblical Law and Jewish Ethics. (3 cr; SP-\$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; SP-\$3034, \$JwSt 1034, \$JwSt 3034; 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; SP-\$1035; 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 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; SP-\$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 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; SP-\$3072, \$3172, \$Clas 3172, \$Clas 3072; 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 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 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; SP-\$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 3171. Honors Course: Greek Religion. (4 cr; SP-\$3071)

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; oracles; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions. Meets with 3071.

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; SP—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; SP—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; SP—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; SP—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; SP—No knowledge of Hebrew 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.

RelA 3502. Ancient Israel: From Conquest to Exile.

(3 cr; SP—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.

RelA 3503. History and Development of Israelite Religion I. (3 cr; SP-\$5503; 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]; SP-Δ)

Student works with faculty on a subject decided upon by both.

RelA 5013. Biblical Law and Jewish Ethics. (3 cr; SP-\$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; SP—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; SP-\$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; SP-\$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; SP-\$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; SP—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; SP-\$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; SP-\$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.

ReIA 5503. History and Development of Israelite Religion I. (3 cr; SP–\$ReIA 3503)

Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

ReIA 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.

ReIA 5993. Directed Studies. (2-4 cr [max 10 cr]) Guided individual reading or study.

Religious Studies (ReIS)

*Department of Classical and Near Eastern Studies
College of Liberal Arts*

ReIS 3521. 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 the theological responses of Jews and Christians.

ReIS 5111. Problems in Historiography and Representation of the Holocaust. (3 cr; SP–JwSt 3521/ ReIS 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.

ReIS 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.

Residential College (RCol)

College of Liberal Arts

RCol 1901. Residential College Seminar for First Year Students. (1-3 cr [max 6 cr]; A-F only) Cultural diversity topic seminars listed in Residential College brochure.

RCol 1902. Residential College Seminar for First Year Students. (1-3 cr [max 6 cr]; A-F only) Cultural diversity topic seminars listed in Residential College brochure.

RCol 1903. Residential College Seminar for First Year Students. (1-3 cr [max 6 cr]; A-F only) Citizenship and public ethics topic seminars listed in the Residential College.

RCol 1904. Residential College Seminar for First Year Students. (1-3 cr [max 6 cr]; A-F only) International perspectives topic seminars listed in Residential College brochure.

RCol 1905. Residential College Seminar for First Year Students. (1-3 cr [max 6 cr]; A-F only) Topics listed in Residential College brochure.

RCol 1906W. First Year Seminar for Freshmen and Transfer Students. (1-3 cr [max 6 cr]; SP–Residential College student; A-F only) Environmental and writing intensive topics listed in Residential College brochure and in *Class Schedule*.

RCol 1907W. First Year Seminar for Freshmen and Transfer Students. (1-3 cr [max 6 cr]; SP–Residential College student; A-F only) Cultural diversity and writing intensive topics listed in Residential College brochure and in *Class Schedule*.

RCol 1908W. First Year Seminar for Freshmen and Transfer Students. (1-3 cr [max 6 cr]; SP–Residential College student; A-F only) Citizenship/public ethics and writing intensive topics listed in Residential College brochure and in *Class Schedule*.

RCol 1909W. First Year Seminar for Freshmen and Transfer Students. (1-3 cr [max 6 cr]; SP–Residential College student; A-F only) International perspectives and writing intensive topics listed in Residential College brochure and in *Class Schedule*.

RCol 1910W. First Year Seminar for Freshmen and Transfer Students. (1-3 cr [max 6 cr]; SP–Residential College student; A-F only) Writing intensive topics listed in Residential College brochure and *Class Schedule*.

RCol 3905. Residential College Seminar for Continuing and Upper Division Students. (1-3 cr [max 18 cr]; A-F only) Topics listed in Residential College brochure

Rhetoric (Rhet)

*Department of Rhetoric
College of Agricultural, Food, and Environmental Sciences*

Rhet 1001. Introduction to Scientific and Technical Communication. (1 cr; S-N only) History of technical communication, its connection to rhetoric. Technical writing, speaking, multimedia, and their applications in science/technology fields (e.g., health science, computer science, agriculture). Portfolios, professional organizations, publications. Guest speakers, discussion, activities.

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; SP–Exemption from 1101 or equiv; A-F only) 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 Cities: 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; QP–3101 or DHA 1300; SP–3562 or DHA 1300; A-F only) 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; QP–1222 or #; SP–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; QP–1222 or equiv or #; SP–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]; QP–STC major or #; SP–STC major or #) See *Class Schedule*.

Rhet 3291. Independent Study. (1-3 cr [max 3 cr]; QP–#, Δ; SP–#, 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; QP–Jr, STC major or #; SP–Jr, STC major or #) Culture of technology; social and personal meanings it holds. Issues of power, work, identity, and our relation to nature. Mass production and consumption, industrialization of agriculture, changes in art and design, and effects of modern transportation and communication technologies.

Course Descriptions

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. The Ethics of Total War. (3 cr)

If ethics exist, even in war, then they have a reality that others might deny them; if there is a right and wrong in war, a strong case can be made that there is a right and wrong everywhere. Experience this claim through its expression in the various media of the arts and humanities: history, memoir, philosophical meditation, 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 3401. Accessing Information Through Electronic Media. (3 cr; QP–Internet access including e-mail and Netscape 3.0 or higher or equiv; SP–Internet access including e-mail and Netscape 3.0 or higher or equiv)

Current and developing tools of Internet-based communication. Concepts of e-mail, Usenet news, mailing lists, Web-based chats, MOOs, and Internet Relay Chat. Emphasis on technology examination, assessment of information delivered, and criteria development for information dissemination.

Rhet 3562. Technical and Professional Writing. (4 cr; QP–[EngC 1011 or 1101 or 1151 or equiv], jr; SP–[EngC 1011 or 1101 or 1152 or equiv], jr; A-F only)

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; QP–[EngC 1011 or 1101 or 1151 or equiv], jr; SP–[EngC 1011 or 1101 or 1152 or equiv], jr; A-F only)

Written/oral communication in professional settings. Gathering information, analyzing audience, assessing conventional formats. Drafting, testing, revising documents. Oral presentation of final reports.

Rhet 3701W. Rhetorical Theory and Scientific and Technical Communication. (4 cr; QP–EngC 1011 or 1101 or 1151 or equiv; SP–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; QP–3562 or equiv or #; SP–3562 or equiv or #; A-F only)

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; QP–3266 or #; SP–3266 or #; A-F only)

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]; QP–STC major, #; SP–STC major, #; S-N only)

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; QP–STC major or #; SP–STC major 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; QP–[3562, [STC major or grad student]] or #; SP–[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 and Managing Projects and Proposals. (3 cr; QP–3562; SP–3562; A-F only)

Research funding sources, interpret an RFP or program announcement, letters of intent, and grant preparation following the guidelines of an RFP or program announcement. Proposals for nonprofits and/or research or business proposals. Will use Microsoft Project.

Rhet 4671. Principles and Application of Project Management and Design I. (3 cr; QP–STC major or grad or #; SP–STC major or grad or #; A-F only)

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; QP–4671 or #; SP–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)

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; SP–5111; A-F only)

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]; QP–STC grad or #; SP–STC grad or #; S-N only)

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)

Questionnaire development, informational interviewing, focus group interviewing. Guides, schedules, questioning techniques, communication theories in employment cycle interviews. Descriptive statistics used to analyze data.

Rhet 5270. Special Topics. (1-3 cr [max 3 cr]; QP–[[STC or RSTC] [major or grad student]], #; SP–[[STC or RSTC] [major or grad student]], #; A-F only)

Topics specified in *Class Schedule*.

Rhet 5291. Independent Study. (1-3 cr [max 3 cr]; QP–#, Δ; SP–#)

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; QP–Grad or sr or #; SP–Grad; A-F only)

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; QP–5531 or #; SP–5531 or #; A-F only)

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; QP–5531, 5532; SP–5531 or 5532; A-F only)

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; QP–3562; SP–3562 or equiv; A-F only)

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 5662W. Advanced Technical Communication. (4 cr; QP–3562; SP–3562 or equiv; A-F only)

Focus on creating multimedia, hypertext, on-line help, and Internet documents. Learn linear and nonlinear design; linking; reading and editing on-line. Principles of technical communication taught through projects: scripts, on-line support, and using a mark-up language.

Rhet 5664. Science Writing for Popular Audiences. (3 cr; QP–3562 or #; SP–3562 or #; A-F only)

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. Francis 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 and Asian and Slavic Languages and Literatures

College of Liberal Arts

Russ 1101. Beginning Russian. (4 cr)

Develop basic proficiency in listening, speaking, reading, and writing. First of four courses designed to satisfy CLA language graduation requirement.

Scandinavian (Scan)

Department of German, Scandinavian, and Dutch
College of Liberal Arts

Scan 1909. Topics: Freshman Seminar. (3 cr; SP–Fr or max 36 cr; A-F only)
Topics specified in *Class Schedule*.

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 folkloric 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.

Russ 1102. Beginning Russian. (4 cr; SP–1101 or equiv)
Develop basic proficiency in listening, speaking, reading, and writing. Second of four courses designed to satisfy CLA language requirement.

Russ 1304. 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 3001. Intermediate Russian. (4 cr; SP–1102 or equiv)
Conversation, composition, grammar review, translation, and readings in appropriate literature.

Russ 3002. Intermediate Russian. (4 cr; SP–3001 or equiv)
Expansion of experience in speaking, reading, and understanding Russian; reading contemporary texts.

Russ 3101. Third-Year Russian. (3 cr; SP–3002 or equiv)
Advanced grammar, conversation, composition, and reading.

Russ 3102. Third-Year Russian. (3 cr; SP–3101 or equiv)
Advanced grammar, conversation, composition, and reading.

Russ 3104. Introduction to Literary Analysis. (3 cr; SP–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; SP–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; SP–\$5211)
Literary, cultural, and political significance of modern Russian literary works.

Russ 3311. Russian Major Project. (3 cr; SP–Advanced Russian major; A-F only)
Directed research and writing in student's chosen field.

Russ 3311H. Honors Major Project in Russian. (3-4 cr; SP–\$3312, \$3311; Russ major, #; A-F only)
Directed research/writing in student's chosen field.

Russ 3404. Tolstoy in Translation. (3 cr; SP–\$5404)
Novels, stories, and philosophical writings of Leo Tolstoy.

Russ 3407. Stories and Plays of Anton Chekhov in Translation. (3 cr; SP–\$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; SP–\$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; SP–\$5411)
Novels, stories, and miscellaneous writings of Fyodor Dostoevsky.

Russ 3421. Literature: Middle Ages to Dostoevsky in Translation. (3 cr; SP–\$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; SP–\$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; SP–\$5601, 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. (3 cr; SP–1102 for language topics)
Variable topics in Russian language, literature and culture. Consult department for details.

Russ 3993. Directed Studies. (1-4 cr; SP–#, Δ, □)
Guided individual study.

Russ 5104. Introduction to Literary Analysis. (3 cr; SP–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; SP–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; SP–\$3404)
Novels, stories, and philosophical writings of Leo Tolstoy.

Russ 5407. Stories and Plays of Anton Chekhov in Translation. (3 cr; SP–\$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; SP–\$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; SP–\$3411)
Novels, stories, and other writings of Fyodor Dostoevsky.

Russ 5421. Literature: Middle Ages to Dostoevsky in Translation. (3 cr; SP–\$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; SP–\$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; SP–\$3601, 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. (3 cr; SP–1102 for language topics)
Variable topics in Russian language, literature, and culture.

Russ 5993. Directed Studies. (1-4 cr; SP–#, 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; SP–5001 or equiv)
Introduction to the classical language of ancient India.

Skt 5201. Intermediate Sanskrit. (3 cr; SP–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; SP–#)
Selected reading and/or study of linguistic problems in Sanskrit.

Skt 5992. Directed Readings. (3 cr; SP–5202 or equiv)
Guided individual reading or study.

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: Scandinavians Abroad and Abroad in Scandinavia. (3 cr)

The experiences in literature of Scandinavians going abroad and foreigners coming to Scandinavia. Culture and travel as self-knowledge, self-revelation, and otherness. Slides and videos of travel destinations from the 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]; SP-#, A, □)

Guided individual reading and study.

Scan 4001. Scandinavian Languages for Reading.

(4 cr; SP—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 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; SP-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; SP-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; SP—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]; SP-#, A, □)

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]; OP-jr or sr major in ScAg, #; SP-jr or sr major in ScAg, #; A-F only)

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 and Asian 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. Ethnocultural 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. Domestic Violence in Global Perspective. (3 cr)

Theories and research on violence in intimate domestic relationships examined through multiple lenses, followed by overview of interventions in Minnesota, United States, and other societies.

SW 4693. Directed Studies. (1-10 cr [max 10 cr]; QP-#; SP-#)

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]; QP-#; SP-#)

Guided research related to social issues, social work methods, or social work history.

SW 5051. Human Behavior and the Social Environment. (2-3 cr; QP—Grad student or 12 cr in social sciences or #; SP—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; QP—Grad or #; SP—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; QP-Grad or 12 cr of social sciences; SP-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; QP-Grad or #; SP-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; QP-Grad or adult special student or #; SP-Grad or non-degree seeking student 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; QP-Grad or adult special student or #; SP-Grad or non-degree seeking student 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; QP-Grad or adult special student or #; SP-Grad or non-degree seeking student 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; QP-Grad or adult special student or #; SP-Grad or non-degree seeking student 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; QP-Grad or adult special student or #; SP-\$8303; grad or non-degree seeking student 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; QP-Grad or adult special student or #; SP-Grad or non-degree seeking student 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; QP-Grad or adult special student or #; SP-\$8314; grad or non-degree seeking student 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; QP-Admission to child abuse prevention specialization; SP-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; QP-Admission to child abuse prevention specialization, #; SP-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; SP-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; SP-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; SP-\$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; QP-1001 or #; SP-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; SP-\$5706, \$5707; grad student or non-degree seeking student 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; QP-Grad or adult special student or #; SP-\$5705; grad or non-degree seeking student or #)
 Major issues and interventions involved in child sexual abuse. Develop knowledge and skills in 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; QP-Grad or adult special student or #; SP-\$5705; grad or non-degree seeking student 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; QP-Grad or adult special student or #; SP-Grad or non-degree seeking student 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 5810. Seminar: Special Topics. (1-4 cr)
 Topics specified in *Class Schedule*.

SW 5811. Social Work Ethics. (2 cr; QP-Grad or adult special student or #; SP-\$8801, grad student or non-degree seeking student 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 5812. Legal Aspects of Social Work. (2 cr; QP-Grad or adult special student or #; SP-\$5813, \$8801; grad or non-degree seeking student or #)
 Legal regulation of social work; licensing standards; professional liability; ethical issues and sanctions. Social worker involvement in legal processes of preparing for court; testimony and cross examination. Substantive law affecting social work practice in selected areas such as child protection, mental health, family law, and domestic violence.

SW 5813. Child Welfare and the Law. (2 cr; QP-Grad or adult special student or #; SP-\$5812, \$8801; second yr MSW or advanced standing or #)
 Social work practice in juvenile court; child abuse and 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. (3 cr; SP-\$1011)
 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. (3 cr; QP-Honors; SP-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 1012W. Introduction to Sociology. (3 cr; SP-\$1001, \$1011V)
 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; QP-#; SP-#)
 For freshmen. Topics specified in *Class Schedule*.

Soc 1091. Independent Study. (1-4 cr; QP-#; SP-#)
 Independent study of an established 1xxx course. Available only by request.

Soc 3003. Social Problems. (3 cr; SP-1001 or #; A-F only)
 Analysis of major social problems including, inequality, crime, drug abuse, pollution, racism, among others. Examination of proposed solutions and evaluation of policy consequences.

Course Descriptions

Soc 3090. Topics in Sociology. (1-3 cr; QP-#; SP-#)
For sophomores. Topics specified in *Class Schedule*.

Soc 3091. Independent Study. (1-4 cr; QP-#; SP-#)
Independent study of an established 3xxx course.
Available only by request.

Soc 3093. Directed Study. (1-4 cr; QP-#; SP-1001, #, Δ, □)
Guided individual reading or study at the sophomore level.

Soc 3094. Directed Research. (1-4 cr; QP-#; SP-1001, #)
Guided research experience at the sophomore level.

Soc 3111. Introduction to Crime and Criminal Justice. (3 cr; A-F only)
Patterns of crime and victimization by social groups, regions, and over time; classical and contemporary theories explaining crime. Principles of criminal justice and agencies (police, courtroom working group, correctional institutions).

Soc 3201. Inequality: Introduction to Stratification. (3 cr; QP-1001; SP-1001 or equiv; A-F only)
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; SP-#WoSt 3201; 1001 or #; A-F only)
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; QP-1001 or #; SP-1001 or #; A-F only)
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 3351W. Politics and Society in the New Europe. (3 cr; QP-#3461; 1001 or Pol 3051 or #; SP-#Pol 3451; 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; QP-1001; SP-1001 or #; A-F only)
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 3451W. Urban Community. (3 cr; QP-1001 or 1002; SP-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 3501. Sociology of the Family. (3 cr; QP-1001 or #; SP-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; SP-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; QP-1001 or #; SP-#EAS 3661; 1001 or courses on or exper in East Asia or #; A-F only)
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; SP-#EAS 3671, \$Geog 3671; 1001 or Geog 1301 or equiv social sciences or humanities course or #; A-F only)
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; QP-8 cr social sciences or #; SP-1001 or #; A-F only)
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; QP-1001, 3801 or equiv; SP-1001 or equiv; A-F only)
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; QP-1001; SP-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; QP-3801, 3802 or equiv or #; SP-3811 or equiv)
Principles and practice of research design, sampling, data collection including field observation and surveys; data management, analysis, and reporting of quantitative and nonquantitative data; ethics and administration in sociological research. For sociology majors. Labs required.

Soc 3801H. Honors: Sociological Research Methods. (4 cr; QP-#[(3801, 3802) or equiv] or #; SP-#3801; [3811 or equiv], honors)
Principles/practice of research design, sampling, data collection. Field observation, surveys. Data management, analysis. Reporting of quantitative/nonquantitative data. Ethics/administration in sociological research. Required lab.

Soc 3811. Basic Social Statistics. (4 cr; QP-Intermediate algebra or GC 0631; SP-Intermediate algebra or GC 0731)
Descriptive statistics including measures of central tendency, deviation, and association; inferential statistics focusing on probability and hypothesis testing. T-tests, Chi-square tests, variance analysis, and bivariate regression. Statistical software used to analyze sociological data.

Soc 3811H. Honors: Basic Social Statistics. (4 cr; QP-GC 0631 or intermediate algebra, honors; SP-#3811; GC 0731 or intermediate algebra, honors)
Descriptive statistics, including measures of central tendency, deviation, association. Inferential statistics, focusing on probability, 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; QP-#3801 recommended; SP-#3811 recommended; S-N only)
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; QP-Jr soc honors student, #; SP-Jr soc honors student; A-F only)
Read and discuss sociological research literature; explore research funding opportunities; design individual research projects.

Soc 4090. Topics in Sociology. (1-3 cr; QP-1001 or #; SP-#)
Topics specified in *Class Schedule*.

Soc 4091. Independent Study. (1-4 cr; QP-#; SP-#)
Independent study of an established 4xxx course.
Available only by request.

Soc 4093. Directed Study. (1-4 cr; QP-#; SP-#, Δ, □)
Guided individual reading or study at the junior/senior level.

Soc 4094. Directed Research. (1-4 cr; QP-#; SP-#)
Guided research experience at the junior/senior level.

Soc 4101W. Sociology of Law. (3 cr; QP-3101-3102 or #; SP-1001 or 3111 or #; 3701 recommended; A-F only)
Sociological analysis of law and society. Why people obey the law, social forces involved in the creation of law (both civil and criminal), procedures of enforcement, and the impact of law on social change.

Soc 4102. Criminology. (3 cr; QP-3101-3102 or #; SP-3111 or #; A-F only)
Nature and types of crime, problems in measuring incidence and trends, and review of sociological theories of crime causation. Implications for crime prevention and control.

Soc 4105. Sociology of Punishment and Corrections. (3 cr; QP-3101, 3102 or #; SP-3111 or #; A-F only)
Advanced study of correctional strategies such as prison, probation, and parole. Theories and structures of diversion, probation, parole, and other community corrections programs. U.S. penal policies and practices compared with those in other countries.

Soc 4107. Comparative Law and Social Control. (3 cr; QP-3101-3102 or #; SP-3111 or #; A-F only)
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; QP-3102 or #)
Selected current criminal justice policies examined from the perspective of courts, legislature, community, and interest groups; impact of criminal justice policy changes on society and social control agencies.

Soc 4109. Domestic Criminal Violence. (3 cr; QP-3101-3102 or #; SP-3111 or #)
Survey of research on family violence within criminological framework. Definition of domestic violence; empirical and theoretical approaches; response of social control agencies.

Soc 4111. Deviant Behavior. (3 cr; QP-3101-3102 or #; SP-3111 or #; A-F only)
Definition and 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; QP-3102 or #; SP-3111 or #)
Historical and 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; QP-3101-3102 or #; 4162, 5161 both recommended; SP-3111 or #; 4161, 5162 both recommended; A-F only)
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; QP-3101-3102 or #; 5161, 5162 recommended; SP-3111 or #; A-F only)
Causes and 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; QP-3101-3102 or #; 5161, 5162 recommended; SP-3111 or #; A-F only)
Childhood and delinquency. Measuring extent and distribution of delinquent behavior. Applying theories to relationships within the family, school, and peer group. Institutional responses to delinquency and evaluating programs for treatment, prevention, and control.

Soc 4142. Juvenile Justice and Law. (3 cr; QP-3101-3102 or #; 5161, 5162 recommended; SP-[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; QP-1001 or #; SP-1001 or #)
Sociological theory and research related to definitions and origins; epidemiology; reaction patterns; use of mental health services.

Soc 4148. Criminal Psychopathology. (3 cr; QP-Sr or grad; SP-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; QP-Sr or grad or law; SP-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; SP-3111 or #)
Purposes of criminal law and principles of criminal liability, justification, and excuse, and their application to the law of criminal homicide, sexual assault, drugs, and crimes against property, public order, and morals.

Soc 4162. Criminal Procedure in American Society. (3 cr; SP-3111 or #)
Critical examination of how a constitutional democracy balances the need to enforce criminal law and rights of individuals to be free of unnecessary government intrusion.

Soc 4305. Society and the Environment: A Growing Conflict. (3 cr; QP-1001 or environmental course or #; SP-1001 or environmental course or #; A-F only)
Societal causes and cures of ecological problems such as global warming, species extinction, and resource exhaustion.

Soc 4441. Work-Family Links. (3 cr; QP-8 cr sociology or #; SP-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 Conflict. (3 cr; QP-3401 or 5401 or equiv or #; SP-1001 or #; A-F only)
Analysis of social conflicts ranging from family and feuds to organizational, industrial, community, sectarian, among others. Contemporary non-lethal and lethal conflicts considered.

Soc 4601. Comparative Social Structure. (3 cr; QP-20 cr sociology or economics or political science or #; SP-1001 or #; A-F only)
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, ethnic identities, multicultures, demography. Methods include network models, Boolean analysis.

Soc 4662. Comparative East Asian Development: A New Model for Growth and Prosperity? (3 cr; QP-Soc/EAS 3481 sociology of development or Asian-related courses or #; SP-Soc/EAS 3661 or East Asian coursework or experience or #; A-F only)
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; QP-1001 or #; SP-1001 or #; A-F only)
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; QP-8 cr social science or #; SP-1001 or #; A-F only)
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; SP-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; QP-All other required sociology coursework, Δ; SP-3701, 3801, 3811, 12 cr upper div sociology, Δ; A-F only)
Defining research problem. Collecting/selecting data. Analyzing data. Writing report.

Soc 4967W. Advanced Senior Project Independent Study. (1 cr; QP-#; SP-3701, 3801, 3811, 12 additional upper div sociology cr, Δ; A-F only)
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; QP-Soc honors major or soc B.S. major, 3201, 3401, 3801, 3802, 3803, min 35 cr in soc; SP-4977-4978; sr soc honors major, 3701, 3801, 3811, 9 additional upper div sociology cr, Δ; A-F only)
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; QP-5977; SP-4977 or #; Δ; Sr soc honors major, 3701, 3801, 3811, 9 additional upper division sociology cr, Δ; A-F only)
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; QP-#; SP-1001 or #)
Topics specified in *Class Schedule*.

Soc 5091. Independent Study. (1-4 cr; QP-#; SP-#)
Independent study of an established 5xxx course.

Soc 5301W. Social Movements. (3 cr; SP-# 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; QP-1001 or equiv or #; SP-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; SP-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. The Atmosphere. (3 cr; QP-Geog 1425; SP-Geog 1425)
A pre-calculus introduction to the nature of the atmosphere and its behavior. Topics include atmospheric composition, structure, stability, and motion; precipitation processes, air masses, fronts, cyclones and anticyclones; general weather patterns; meteorological instruments and observation; weather map analysis; weather forecasting.

Soil 1426W. The Atmosphere Laboratory. (1 cr; SP-Geog 1426)
Lab offered with 1425. Topics include weather observation; meteorological instrumentation; statistical analysis of weather observations and climatological data; map analysis and weather forecasting.

Soil 2125. Basic Soil Science. (4 cr [max 4 cr]; QP-§1125; Chem 1051; SP-§1125; Chem 1021 or equiv)
Basic physical, chemical, and biological properties of soil. Soil genesis classification and 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 Land-use Management. (3 cr; QP-1020 or 3125 or #; SP-1125 or 2125 or #)
Historical causes and consequences of accelerated soil erosion; wind and water erosion; soil conservation techniques; strategies to optimize soil conservation; consideration of economic, political, and sociological influences on soil conservation planning.

Soil 3416. Plant Nutrients in the Environment. (3 cr; QP-3125; SP-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]; QP-5510; SP-4511)
Learn about collegiate soil judging by participating in a regional or national soil judging contest.

Soil 3612W. Soil and Environmental Biology. (3 cr; QP-3125 recommended, Biol 1009 or equiv, Chem 1051 or equiv; SP-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; QP–AgEc 3610 or #, jr or sr, 16 cr of science; SP–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]; QP–#; SP–#)

Research, readings, and instruction.

Soil 4094. Directed Research. (1-7 cr [max 7 cr]; QP–#; SP–#)

Research under the direction of department faculty.

Soil 4121. Microbial Ecology and Applied

Microbiology. (3 cr; QP–5610, 5013 or MicB 5105 or #; SP–3612, Biol 3301 or MicB 3301; A-F only)
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; QP–3125; SP–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; QP–[3125, [Chem 1051 or equiv], [Phys 1042 or equiv]] or #; 3416 recommended; SP–[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; QP–#; SP–#; S-N only)
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. Biometeorology. (3 cr; QP–Biol 1009 or equiv, Math 1251, Phys 1041 or #; SP–Biol 1009 or equiv, Math 1271, Phys 1041 or #)

Microclimates, and energy and mass transfer between organisms and their environment. Consider the basic environmental variables of temperature, humidity, wind, and radiation and apply these concepts to plants, animals, and soil-atmosphere exchange processes.

Soil 5232. Vadose Zone Hydrology. (3 cr; QP–[[Math 1251 or equiv], [Phys 1041 or equiv]] or #; SP–[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;

QP–[[Chem 1052 or equiv], Phys 1042, grad] or #; SP–[[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; QP–5360; SP–¶5311 recommended)
Companion laboratory 5311. Clay mineral preparation for x-ray diffraction, selective mineral dissolution, cation exchange properties, adsorption and solubility reactions and their modeling, carbonate equilibria, and organic matter extraction and identification.

Soil 5402. The Atmospheric Boundary Layer. (3 cr; QP–Math 1251, Phys 1251, Stat 3011; SP–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]; QP–Math 1251, Phys 1251, Stat 3011; SP–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; QP–3125 or #; SP–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 5555. Wetland Soils. (2-3 cr; QP–1020 or 3125 or equiv or #; ¶4511 recommended; SP–1125 or 2125 or equiv or #; ¶4511 recommended; A-F only)

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; QP–1020 or 3125, Biol 1009/1221-22 or Chem 1051, Stat 3011, ApEc 1101 or #; SP–1125 or 2125, Biol 1002/1009 or Chem 1021, Stat 3011, ApEc 1101 or #; A-F only)

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; QP–3125, Biol 1009 or equiv, Chem 1051 or equiv, sr or grad, BioC 3xxx and MicB 3xxx recommended; SP–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; QP–1020 or 3125; SP–1125 or 2125)

Factors affecting tree growth; estimation, modification, and management effects on site productivity; regeneration.

South Asian Languages and Cultures (SALC)

Institute of Linguistics and Asian and Slavic 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.

Spanish (Span)

Department of Spanish and Portuguese Studies College of Liberal Arts

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; SP-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; SP-#, 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; SP-#, Δ, □)

Directed research on topics of language, literature, or civilization selected by qualified students with consent of instructor and studied on tutorial basis.

Span 2021. 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. (4 cr; SP-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. (4 cr; SP-1001 or [#; Δ])

Listening, speaking, reading, writing. Emphasizes development of communicative competence. Cultural readings.

Span 1003. Intermediate Spanish. (4 cr; SP-[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. (4 cr; SP-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; SP-1003 or [#; Δ])

Vocabulary, report writing skills, proper format for business communications, conversational fluency on trade-related topics.

Span 1022. Alternate Second-Semester Spanish. (4 cr; SP-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 1102. Beginning Spanish II, Transition. (3.33 cr; QP-1101; A-F only)

Basic listening, speaking, reading/writing skills. Emphasizes development of communicative competence. Some cultural readings.

Span 1103. Beginning Spanish III, Transition. (3.33 cr; QP-1102; A-F only)

Basic listening, speaking, reading, and writing skills. Emphasizes development of communicative competence. Some cultural readings.

Span 1105. Intermediate Spanish II, Transition. (3.33 cr; QP-1104 or 4 yrs high school Spanish; A-F only)

Speaking/comprehension. Development of reading/writing skills based on materials from Spain and Spanish America. Grammar review. Compositions, oral presentations.

Span 1106. Intermediate Spanish III, Transition. (3.33 cr; QP-1105 or 5 yrs high school Span; A-F only)

Speaking/comprehension. development of reading/writing skills based on materials from Spain and Spanish America. Grammar review. Compositions, oral presentations.

Span 1902. Topics: Freshman Seminar. (3 cr; SP-Fr or max 36 cr; A-F only)

Topics specified in *Class Schedule*.

Span 1907W. Topics: Freshman Seminar. (3 cr; SP-Fr or max 36 cr; A-F only)

Topics specified in *Class Schedule*.

Span 3015. Spanish Composition and Communication. (4 cr; SP-[1004 or 1014], GPT)

Comprehending written/spoken texts. Speaking, reading, and writing beyond the intermediate level.

Span 3021. Advanced Communication Skills. (4 cr; SP-3015 or [#; Δ])

Improving language skills for fluency/accuracy in Spanish.

Span 3022. Advanced Business Spanish. (3 cr;

QP-[1106 or equiv], GPT in Spanish; SP-[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; SP-3015 or [#; Δ]; A-F only)

Various ways of understanding structure of diverse texts, interpreting their meaning.

Span 3105W. Introduction to the Study of Hispanic Civilizations. (3 cr; SP-[3015, GPT] 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; SP-[3015, GPT] 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; SP-§3311; 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; QP-3104, honors; SP-3104, honors; A-F only)

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) are examined within historical and cultural contexts.

Span 3212. Literary Discourses of Modern and Contemporary Spain (1800-Present). (3 cr; SP-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; SP-3104, honors; A-F only)

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; SP-§3421; 3015 or 3105 or #)

Critical account of conquest, colonization, and resistance in Spanish America.

Span 3221H. Honors: Latin American Colonial Discourses Since 1492. (3 cr; SP-[3015 or 3104 or #], honors; A-F only)

Critical account of conquest, colonization, and resistance in Spanish America.

Span 3222. Discourses of Nation Building and Modernization in Latin America. (3 cr; SP-§3422; 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; SP-[3105, honors] or #; A-F only)

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; SP-1004, Δ)

Students participate in Spanish-speaking community organizations; analyze academic materials dealing with race, class, gender, current patterns of power in the United States, roles of citizens within system; relate this to their community experience.

Course Descriptions

Span 3501. Spanish Civilization: Roots of Modern Spain and Latin America. (3 cr; SP-3411; 3105)

Customs, lifestyles, art, and culture from coexistence of Christians, Moors, and Arabs during reconquest to national unification. Discoveries/conquests up to “modern state”/political crises of early 19th century.

Span 3501H. Honors: Spanish Civilization—Roots of Modern Spain and Latin America. (3 cr; SP-3501; [3104 or 3105], honors; A-F only)

Customs, lifestyles, art, and culture from the coexistence of Christians, Moors, and Arabs during the reconquest to national unification; discoveries/conquests up to the “modern state” and political crises of the early nineteenth century.

Span 3502. Spanish Civilization: Modern Spain. (3 cr; SP-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; SP-3105, honors; A-F only)

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]; SP-3410; 3105; A-F only)

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; SP-3105, honors; A-F only)

Practices that have shaped the cultural identity of Spanish- and 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; SP-3412; 3105; A-F only)

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; SP-3512; 3104 or 3105 or 3107; A-F only; A-F only)

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; SP-N/A for major/minor)

Cultural/symbolic implications of selected human rights issues involving inter-American relations. Course taught in English.

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; SP-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; SP-3701; 3107, honors; A-F only)

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; SP-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; SP-[3107 or #], honors; A-F only)

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; SP-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; SP-[3107 or #], honors; A-F only)

Relationships with Latin. Phonetic, morphological, syntactic, and sociolinguistic aspects of diachronic variation.

Span 3704. Sociolinguistics of the Spanish-Speaking World. (3 cr; SP-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; SP-3107, honors; A-F only)

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; SP-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; SP-3107, honors; A-F only)

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]; SP-3107 or #)

Topics specified in *Class Schedule*.

Span 3730H. Honors: Topics in Hispanic Linguistics. (3 cr; SP-[3107 or #], honors; A-F only)

Topics specified in *Class Schedule*.

Span 3910. Topics in Spanish Peninsular Literature. (3 cr [max 9 cr]; SP-3104 or #)

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; SP-[3104, honors] or #; A-F only)

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]; SP-3104 or #)

Focus on a 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; SP-[3104 or #], honors; A-F only)

Focuses on a 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]; SP-3104 or #)

One major writer or group of writers whose work has had an impact on Spanish thought, literature, or analysis of social patterns. Figures specified in *Class Schedule*.

Span 3940H. Honors: Figures in Spanish Peninsular Literature. (3 cr [max 9 cr]; SP-Span 3104 or # and Honors status; A-F only)

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]; SP-3104 or #)

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]; SP-[3104 or #], honors; A-F only)

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]; SP-#, 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; SP-31 cr of [3xxx or SpPt 3xxx] courses, honors; Δ; A-F only)

Work on major project about Hispanic linguistics, language acquisition; or about cultural studies; or about peninsular or Latin American or U.S. Latino theatre/literatures.

Span 3972W. Graduation Seminar. (3 cr; SP-31 cr of [3xxx or SpPt 3xxx] courses, Δ, permission number; A-F only)

Work on major project about Hispanic linguistics. Language acquisition. Cultural studies. Peninsular, Latin American, U.S. Latino theatre/literatures.

Span 5106. The Literature of the Reconquest and Feudal Spain. (3 cr; SP-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; SP-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; SP-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; SP-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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—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; SP—#)

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; SP—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; SP—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; SP—#)

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; SP—#)

Concepts used in current literature in Spanish pragmatics, such as deixis, presupposition, conversational implicature, speech act theory, and conversational structure.

Span 5731. Spanish Dialectology: Regional and

Social Dialects of Modern Spain. (3 cr; SP—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;

SP—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 5910. Topics in Spanish Peninsular Literature.

(3 cr [max 9 cr]; SP—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]; SP—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]; SP—#)

Problems in Hispanic linguistics; a variety of approaches and methods.

Span 5970. Directed Readings. (1-4 cr [max 9 cr];

SP—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; SP—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]; SP—#, Δ, □)

Span 5991. The Acquisition of Spanish as a First and Second Language. (3 cr; SP—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; SP—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; SP—\$3456, \$3256; Span 3105, honors; A-F only)

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 Usgli. Films, videos, attendance of local and touring theatre groups.

Course Descriptions

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; SP—Reading knowledge of Span and Port; A-F only)

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; SP—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.

Speech-Communication (Spch)

Department of Speech—Communication
College of Liberal Arts

Spch 1101. Introduction to Public Speaking. (3 cr)

Oral communication processes and elements. Criticism of and response to oral discourse. Individual speaking.

Spch 1101H. Honors: Introduction to Public Speaking. (3 cr; SP—§1101; honors)

Oral communication processes/elements. Criticism of, response to oral discourse. Individual speaking.

Spch 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.

Spch 1102H. Honors: Introduction to Communication. (3 cr; SP—§1102; honors)

Verbal/nonverbal communication: public address, interpersonal, organizational, intercultural, electronic. Ways in which new communication technologies influence/are influenced by existing forms of communication.

Spch 1313V. Honors: Analysis of Argument. (3 cr; SP—§1313V; honors)

Strategies for analyzing, evaluating, generating arguments. Problems in listening/responding to argument.

Spch 1313W. Analysis of Argument. (3 cr)

Strategies for analyzing, evaluating, generating arguments. Problems in listening/responding to argument.

Spch 3110. Topics in Speech-Communication. (3 cr [max 6 cr]; SP—[3211 or 3401 or 3601] [whichever is relevant to topic])

Cases illustrating speech-communication theory, underlying issues.

Spch 3131. Leadership Theory and Practice. (3 cr [max 6 cr]; SP—Student hired for leadership position in New Student Programs, #; S-N only)

Preparation for New Student Program leadership position. Attitudes/skills with leadership and student life issues. Building authentic community.

Spch 3190H. Honors: Research Seminar in Communication. (3 cr [max 6 cr]; SP—Honors candidate in spch, #, Δ; A-F only)

Conduct original research in rhetoric, communication theory, or media for honors thesis. Theory, methods, research writing.

Spch 3201. Introduction to Electronic Media Production. (3 cr; SP—1101 or #; A-F only)

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.

Spch 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.

Spch 3401. Introduction to Communication Theory. (3 cr; SP—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.

Spch 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.

Spch 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.

Spch 3405. Language and Gender. (3 cr; SP—\$WoSt 3305; one women's studies course)

Gender/communication. Interdisciplinary theory. Role of communication in creating, maintaining, reinforcing, and changing gender relations in society.

Spch 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.

Spch 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.

Spch 3422. Interviewing and Communication. (3 cr; SP—1101 or #; A-F only)

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.

Spch 3431. Persuasion Theories. (3 cr; SP—Soph recommended)

Sociological, psychological, and communication perspectives. Theoretical knowledge applied to persuasion problems.

Spch 3441. Introduction to Organizational Communication. (3 cr; SP—1101 or equiv)

Functions of communication in work groups, in organizational hierarchies, and between organizations.

Spch 3451W. Intercultural Communication: Theory and Practice. (3 cr; SP—Planning an intercultural experience)

Theories of and factors influencing intercultural communication. Development of effective intercultural communication skills.

Spch 3452W. Communication and the Intercultural Reentry. (3 cr; SP—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.

Spch 3601V. Honors: Introduction to Rhetorical Theory. (4 cr; SP—1101, honors student; A-F only)

Theoretical systems to explain/direct the creation of public discourse. Traditional rhetoric to contemporary perspectives. Using theory to explain practice of public discourse.

Spch 3601W. Introduction to Rhetorical Theory. (3 cr; SP—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.

Spch 3605W. Persuasive Speaking and Speech Writing. (3 cr [max 3 cr]; SP—Soph)

Performance and composition with critical inquiry into rhetoric theories. Develops writing, thinking, and speaking skills.

Spch 3615. Argumentation. (3 cr; SP—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.

Spch 3625. Communication Ethics. (3 cr; SP—1102 or #; A-F only)

Applying concepts and theories from philosophy and social science to ethical issues in interpersonal, group, organizational, intercultural, and media communication.

Spch 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.

Spch 3970. Directed Study. (1-3 cr [max 6 cr]; SP—One Spch course, #, □ Δ, [no program cr for Spch majors])

Guided individual reading or study.

Spch 3980. Directed Instruction. (3 cr [max 6 cr]; SP—#, Δ, [no program cr for Spch majors]; S-N only)

Supervised planning and teaching of undergraduate courses.

Spch 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.

Spch 4231. Comparing Electronic Media Systems. (3 cr; SP—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.

Spch 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.

Spch 4291. New Telecommunication Media. (3 cr; SP—3211 or #; A-F only)

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.

Spch 4452W. Intercultural Interaction: Theory and Application. (3 cr; SP—#)

Small group interaction across cultures for both international and U.S. students. Discussion, simulations, readings.

Spch 4616. African American Civil Rights Rhetoric. (3 cr; SP—Jr)

Uses the struggle of African Americans to explore and analyze philosophical concepts, political issues, moral complexities, and discursive characteristics of civil rights rhetoric.

Spch 4621W. Rhetoric of Feminism. (3 cr; SP—4615 or #)

History and criticism of the rhetoric of feminism from 19th century to the present.

Spch 5110. Special Topics in Communication Theory. (3 cr [max 6 cr])
Advanced theoretical problems. See department office for current offering.

Spch 5210. Contemporary Problems in U.S. Electronic Media. (3 cr [max 3 cr]; SP-3211)
Problems affecting U.S. commercial and educational electronic media. Audiences; race/gender issues; regulation.

Spch 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.

Spch 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.

Spch 5261. Communicative Processes in Electronic Media. (3 cr; SP-3211 or #)
Organizational practices of media communicators; media content as a link between communicators and audiences; how viewers use and process media content.

Spch 5401. Advanced Theories of Communication. (3 cr; SP-3401 or grad)
Survey of major theoretical approaches to communication including, positivism, constructivism, and systems.

Spch 5402. Advanced Interpersonal Communication. (3 cr; SP-1102, 3402 or 3411 or 3431 or 3441 or 3451)
Social scientific approaches to interpersonal communication; theory and research findings.

Spch 5404. Language and Culture. (3 cr; SP-3401 or #)
How language and communication transmit cultural knowledge, attitudes, and beliefs. Connections among language, thought, and culture. Social and ethnic perspectives on the study of language and communication.

Spch 5406. Communication and Gender. (3 cr; SP-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.

Spch 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.

Spch 5411. Small Group Communication Research. (3 cr; SP-3411 or #; A-F only)
Survey of small group communication research; theory and practice. Group decision-making and leadership.

Spch 5421. Quantitative Methods in Communication Research. (3 cr; SP-3401 or #; A-F only)
Social scientific methods used in studying human communication. Optional data processing laboratory for additional credit.

Spch 5431. The Process of Persuasion. (3 cr; SP-3431)
Communication campaigns (e.g., advertising, political) illustrating persuasive processes and theories. Research paper required.

Spch 5441. Communication in Human Organizations. (3 cr; SP-9 or social science, 3441 or #)
Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.

Spch 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.

Spch 5461. Conversation Analysis. (3 cr; SP-Ling 3001 or Ling 5001)
Discourse processes in dyadic and multiparty conversation. Application of concepts through analysis of conversations.

Spch 5462. Field Research in Spoken Language. (3 cr; SP-5461, Ling 3001 or Ling 5001)
Transcribing and analyzing verbal communication and movement related to it. Applying concepts to recorded conversations.

Spch 5611. Survey of Rhetorical Theory. (3 cr; SP-1101)
Survey of rhetorical theory from ancient to contemporary period; application of theory to public discourse.

Spch 5615W. Introduction to Rhetorical Criticism. (3 cr; SP-1101, 3601 recommended)
Analysis of public discourse using various theoretical perspectives.

Spch 5617. History and Criticism of U.S. Public Discourse: 1630-1865. (3 cr; SP-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.

Spch 5618. History and Criticism of U.S. Public Discourse: 1865-1950. (3 cr; SP-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.

Spch 5970. Directed Study. (1-3 cr [max 6 cr]; SP-Nine 3xxx-5xxx Spch cr, #, Δ, □ S-N only)
Guided individual reading or study.

Sport Studies (SpSt)

*School of Kinesiology and Leisure Studies
College of Education and Human Development*

SpSt 1701. Introduction to Sport Studies. (2 cr; QP-Spst majors only; SP-Spst majors only; A-F only)
Scope and motive of the study of sport from a sociological, psychological, historical, economic, and scientific perspective; issues in sport.

SpSt 3111. Sports Facilities. (2 cr; QP-Spst majors only; SP-Spst majors only; A-F 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; QP-Spst majors only; SP-Spst majors only; A-F 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; QP-2 cr coaching course, kin or spst major; SP-Spst majors only; A-F 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; QP-Spst majors only; SP-Spst majors only; A-F 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; SP-Spst; A-F only)
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; QP-Spst majors only; 3610 recommended; SP-Spst majors only; 3611 recommended; A-F only)
The study of violence, demonstrative behavior, sportmanship, 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; QP-Spst majors only; SP-Spst majors only; A-F only)
Introduction to sport psychology. Examines people and their behavior in sport contexts.

SpSt 3621. Applied Sport Psychology. (2 cr; QP-Spst majors only; SP-Spst majors only; A-F 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; QP-Spst majors only; SP-Spst majors only; A-F 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; SP-[Kin or SpSt] major; A-F only)
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; QP-Spst majors only; SP-Spst majors only; A-F only)
Survey of legal issues in sport, including governance, contracts, civil rights, civil liberties, torts, due process, and employment and work-related legalities.

SpSt 3881. Senior Seminar in Sport Studies. (3 cr; QP-spst majors only, completion of major coursework; SP-Spst majors only, completion of major coursework; A-F only)
Presentations and discussions on sport-related topics of interest.

SpSt 3996. Practicum: The Sport Experience. (1-10 cr [max 10 cr]; QP-3880; SP-3881; S-N only)
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; QP-High school algebra; SP-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; QP-Two yrs high school math; SP-\$5021; 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; QP-[Differential, integral] calculus; SP-Math 1272)
Elementary probability, probability distributions. Sampling, elements of statistical inference. Regression.

Stat 3022. Data Analysis. (4 cr; QP-3011 or 3091; SP-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; QP-Math 1252; SP-\$5101, \$Math 5651; Math 1272)
Random variables/distributions. Generating functions. Standard distribution families. Data summaries. Sampling distributions. Likelihood/sufficiency.

Course Descriptions

Stat 4102. Theory of Statistics II. (4 cr; QP-5121; SP-\$5102; 4101)

Estimation. Significance tests. Distribution free methods. Power. Application to regression and to analysis of variance/count data.

Stat 4893W. Senior Paper. (1 cr; QP-Stat major; SP-Stat major)

Either (1) paper on specialized area or (2) consulting project or (3) original computer program. Directed study.

Stat 5021. Statistical Analysis. (4 cr; QP-College algebra or #; SP-\$3011; 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; QP-[3012 or 3091 or 5021 or 5122 or 5132 or 5152], Math 1252; SP-[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; QP-5122 or 5132 or 5152 or #; SP-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; QP-\$5121, \$5122; Math 3252; SP-\$4101, \$5651; 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; SP-\$4102; 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; QP-3091 or 5021 or 5121 or #; SP-3011 or 3021 or 5021 or #)

Simple random, systematic, stratified, and unequal probability sampling. Ratio, model based estimation. Single stage, multistage, and adaptive cluster sampling. Spatial sampling.

Stat 5302. Applied Regression Analysis. (4 cr; QP-\$5161; 3012 or 5021 or 5133 or 5153; SP-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;

QP-\$5163; 3012 or 5021 or 5133 or 5153 or #; SP-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; QP-5302 or 5133 or 5153; SP-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; QP-\$5162; 3012 or 5021 or 5133 or 5153 or #; SP-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; QP-5021 or 5122 or 5132 or 5152 or #; SP-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; SP-#)

Topics vary according to student needs and available staff.

Stat 5932. Topics in Statistics. (3 cr; SP-#)

Topics vary according to students' needs and available staff.

Stat 5993. Tutorial. (1-6 cr [max 12 cr]; SP-#)

Directed study in areas not covered by regular offerings.

Sumerian (Sum)

*Department of Classical and Near Eastern Studies
College of Liberal Arts*

Sum 5011. Elementary Sumerian I. (3 cr; SP-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; SP-5011) Reading from classical literary and historical texts.

Swedish (Swed)

*Department of German, Scandinavian, and Dutch
College of Liberal Arts*

Swed 1001. Beginning Swedish. (4 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. (4 cr; SP-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. (4 cr; SP-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. (4 cr; SP-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; SP-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; SP-Passing score on GPT)

Discussion of novels, short stories, plays, articles. Structural, stylistic, vocabulary-building exercises.

Swed 4001. Beginning Swedish. (2 cr; SP-\$1001,

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; SP-\$1002, 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; SP-\$1003, 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; SP-\$1004, 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 and Asian and Slavic
Languages and Literatures
College of Liberal Arts*

TESL 3001. Basics in Teaching English as a Second Language. (4 cr; SP-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; SP-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; SP-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; SP-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. (3 cr; SP-ESL major or minor, 5721 or #; S-N only)

Observation of, and practice in, teaching English as a second language to adults at the college or university level.

TESL 5723. Materials for Teaching English as a Second Language. (3 cr; SP-5721, 5722 or #)

Evaluation and preparation of teaching materials for English as a second language.

TESL 5724. Introduction to Language Assessment. (3 cr; QP-Ling 5001 or #; SP-Ling 5001 or #; A-F only)

Prepares students to engage in meaningful, appropriate, and fair second-language assessment practices. Students develop ability to interpret test results and to construct new forms of assessment.

TESL 5910. Seminar in Teaching English as a Second Language. (3 cr [max 9 cr]; SP-#)

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]; SP-#, Δ, □)

Directed study for teaching English as a second language.

Theatre Arts (Th)

Department of Theatre Arts and Dance
College of Liberal Arts

Th 1101W. Introduction to the Theatre. (3 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; SP—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; QP-1101 or ¶1101; SP-1101 or ¶1101)

Background/techniques of acting as viewed/practiced in theatre, society, and student's own relationships.

Th 1321. Beginning Acting. (3 cr; QP-1101; SP-1101 or ¶1101)

Acting technique for stage. Emphasizes Stanislavski-based vocabulary. Exercises/improvisations leading to scene work/monologues.

Th 1351. Vocal Production and Beginning Movement for Actors. (3 cr; QP-1101; SP-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 1401. Introduction to Performance. (4 cr)

Hands-on exploration of live performance. What it means to be a performer. How live performance fits into culture. Live performance's range/diversity, historical context, current trends.

Th 1405H. Honors: The Theatre—Introduction and Beyond. (2 cr; QP-1101, #; SP-1905; 1101 or ¶1101)

Topics specified in *Class Schedule*.

Th 1909W. Topics: Freshman Seminar. (3 cr; SP-Fr or max 36 cr; A-F only)

Topics specified in *Class Schedule*.

Th 1910W. Topics: Freshman Seminar. (3 cr; A-F only)

Topics specified in *Class Schedule*.

Th 3100. Theatre Practicum. (1 cr [max 4 cr]; SP-1101; only two registrations as actor may count toward major; S-N only)

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; QP-#; SP-#)

Study of traditional play structure, characterization, dialogue, dramatic action, and theme. Final project is a one-act play.

Th 3171. History of the Theatre: Ancient Greece Through Neo-Classicism. (3 cr; QP-Th major or #; SP-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; QP-Th major or #; SP-Th major or #)

Theatrical practices, staging conventions, dramatic structure of plays.

Th 3261. Dramas of Culture: 20th-Century French and Francophone Theatre. (3 cr; SP-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 3321. Intermediate Acting I. (3 cr; QP-[1321, 1341] or #; SP-1101, 1321, 1351)

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. Intermediate Acting II. (3 cr; QP-3321; SP-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 3361. Introductory Musical Theatre. (3 cr; A-F only)

History of American musical theatre featuring videos/discussions, basic music theory, voice, dance, acting, audition techniques. Solo/ensemble presentations for public class performance.

Th 3513. Design and Technical Production I. (4 cr; QP-[1101, 1504, 3100/5100] or #; SP-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; QP-[1101, 1504, 3100/5100] or #; SP-3513)

Theory, process, and execution of design/technology from script to production on stage. Costumes/lighting.

Th 3711. Beginning Directing. (3 cr; QP-1101, 1321, jr; SP-1101, 1321, [sr or # [if jr]])

Techniques/theories of stage direction. Script analysis. Composition. Blocking. Rehearsal methods. Improvisation. Actor coaching. Scene production.

Th 3950. Topics in Theatre. (1-4 cr [max 8 cr]; QP-Varies by topic; SP-Varies by topic)

Topics specified in the *Class Schedule*.

Th 4131. Shakespeare: Comedies, Romances, and Problem Plays. (3 cr; QP-1101 or #; SP-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; QP-1101 or #; SP-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; SP-[[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; SP-[[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 4322. Acting for the Camera. (3 cr; QP-3323 or MFA actor or #; SP-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 4532. Makeup for the Actor. (2 cr; QP-1101; SP-1101)

Topics vary. May include functions/aesthetics of stage makeup, application techniques, prosthetics, and facial hair.

Th 4711. Intermediate Stage Direction. (3 cr; SP-3711 or #)

Coordinating/guiding collaborative artistic team. Script selection, textual analysis, concept development, space use, composition, movement, dialogue. Final presentation of scene. Intensive research, textual examination, journal.

Th 4901. Senior Seminar. (1 cr [max 2 cr]; QP-Sr, [Th or Dnce major]; SP-Sr, [Th or Dnce major]; must reg for 1 cr fall, 1 cr spring in same acad yr; S-N 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]; SP-\$4905; 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; QP-#, Δ; SP-#, 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 5310. MFA Actors Studio. (1 cr [max 3 cr]; QP-MFA actor or # [by audition]; SP-MFA actor or # [by audition]; S-N only)

Application of elements of performance, including research, creative thinking, and rehearsal.

Th 5321. Career Preparation for the Actor. (3 cr; QP-3323 or MFA actor or #; SP-3322)

Information/techniques necessary for professional acting career.

Th 5331. Physical Approaches to Acting: Use of Self. (2 cr; QP-3323, # by audition or MFA actor; SP-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; QP-3323, # by audition or MFA actor; SP-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; QP-3323, # by audition or MFA actor; SP-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.

Course Descriptions

Th 5334. Physical Approaches to Acting; Mask. (2 cr; QP-3323, # by audition or MFA actor; SP-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; QP-MFA or #; SP-MFA or #; A-F only)

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; QP-MFA or #; SP-MFA or #; A-F only)

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; QP-#, Δ; SP-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; QP-[3513 or 3515 or grad], #; SP-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; QP-Grad or 3513, 3711; #; SP-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]; QP-3513 or grad or #; SP-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]; QP-3515 or grad or #; SP-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]; QP-3515 or grad or #; SP-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; QP-3515 or grad or #; SP-3515 or grad or #)

The lighting technician's skills and crafts: equipment, techniques, control operation, wiring, and maintenance.

Th 5550. Sound Design for Performance. (3 cr [max 9 cr]; QP-5564 or #; SP-5555 or #)

Audio technology and psychology and their impact on an audience in a performance situation. Communication, design process, psychoacoustics, and script analysis.

Th 5555. Audio Technology. (3 cr; QP-5564 or #; SP-Th major or #)

Sound as science. Technology to create/manipulate sound. Recording techniques. Effects/signal processing. Microphone/mixing techniques.

Th 5557. Digital Audio and MIDI for Performance. (3 cr)

Hands-on computer/CPU-generated audio technology. Use of MIDI language protocol for performance in all aspects of the arts.

Th 5560. Drawing, Rendering, and Painting for the Theatre Designer II. (3 cr; QP-5510; SP-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]; QP-3513 or grad or #; SP-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]; QP-3515 or grad or #; SP-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]; QP-#, Δ; SP-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; QP-3711 or grad or #; SP-[3711, #] or grad)

Realistic/nonrealistic dramatic forms. Theory/technique of rehearsal. Production problems. Includes directing of three one-act plays.

Th 5715. Actor-Director Collaboration. (3 cr; QP-3323, 3711 or #; SP-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; QP-[1101, 1504, 1321] or #; SP-[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)

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; QP-5711 or grad; SP-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; QP-5716, #; SP-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]; QP-5718; SP-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]; QP-Varies by topic; SP-Varies by topic)

Topics specified in *Class Schedule*.

Th 5993. Directed Study. (1-5 cr [max 20 cr]; QP-6 Th cr, #, Δ, □ SP-6 Th cr, #, Δ, □)

Guided individual reading or study.

Toxicology (Txcl)

Graduate School

Txcl 5011. Principles of Toxicology. (2 cr; SP-Grad txcl major or #; A-F only)

Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers.

Translation And Interpreting (TrIn)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

TrIn 3001. Introduction to Translation. (3 cr; QP-Bilingual proficiency in English and the second language of instruction; SP-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; QP-3001 recommended, high level of proficiency in spoken English and another language; SP-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; QP-3101, high level of proficiency [in spoken English and in another language] as demonstrated by application; SP-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 3103. Interpreting II. (3 cr; QP-3102; SP-3102) Practical and theoretical course aimed at achieving professional levels of proficiency with emphasis on interpreting professional/client dialogues. Analysis of the interpreting process, consecutive and simultaneous interpreting, intercultural issues, and situational ethics. Subject language specified in *Class Schedule*.

TrIn 5900. Topics in Translation and Interpreting. (3 cr; QP-#, SP-#) Topics specified in *Class Schedule*.

TrIn 5993. Directed Study. (1-3 cr; QP-#, Δ, □ SP-#, Δ, □) Directed study in translation and interpretation.

University College (UC)

College of Continuing Education

UC 3075. Directed Study. (1-15 cr; SP-#)

UC 3200. Continuing Studies. (1 cr [max 1 cr]; SP-PIL student, Δ; S-N only) Allows student to complete a PIL course for which an incomplete was received. Also allows access to academic advising.

UC 3211. Degree Planning. (8 cr; SP-PIL student; S-N only) Students develop individualized curricular plans for their baccalaureate degrees.

UC 3212. Degree Planning. (4 cr; SP-PIL, Δ; S-N only) Degree planning.

UC 3251. Individualized Study. (4 cr; SP-Admitted to Program for Individualized Learning; S-N only) Students develop a project proposal, identify resources, conduct research, and complete a project (e.g., paper, performance, Web site). Narrative evaluation from the project adviser/evaluator required.

UC 3281. Major Project. (8 cr; SP–Admitted to Program for Individualized Learning; S-N only)
Students develop a project proposal, identify resources, conduct research, and complete a capstone project for their degree. Narrative evaluation from the project adviser/evaluator required.

UC 3282. Major Project. (4 cr; SP–PIL student, Δ; S-N only)
Additional time to work on major project.

UC 3283. Major Project. (4 cr; SP–PIL student, Δ; S-N only)
Additional semester to complete major project.

UC 3291. Graduation Preparation. (8 cr; SP–Admitted to Program for Individualized Learning; S-N only)
Students compile a graduation dossier for presentation to graduation review committee. The dossier consists of a criteria summary, statement of readiness, transcripts, illustrative materials, and an approved degree plan.

UC 4299. Graduation Review. (4 cr; SP–Passed preliminary review; S-N only)
Students revise graduation dossier and present to graduation review committee for BA or BS approval.

UC 4301. Perspectives: Interrelationships of People and Animals in Society Today. (2-3 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: Historical, Management, Human Health, and Regulatory Issues. (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. Discusses laws to control waste production and manage accumulated waste.

Urban Studies (UrBS)

Department of Geography
College of Liberal Arts

UrBS 1001W. Introduction to Urban Studies: The Complexity of Metropolitan Life. (3 cr; SP–\$3001; A-F only)
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; SP–\$1001; A-F only)
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; SP–Δ; 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; SP–Δ; 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 6 cr]; SP–[1001 or 3001 or equiv], Δ; 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]; SP–Sr, internship placement, Δ, #; A-F only)
Weekly seminar integrates internship experience with academic program.

UrBS 3955W. Senior Paper Seminar. (1 cr; SP–Δ, UrBS sr, #; A-F only)
Methods/resources for research. Substantial writing.

UrBS 3993. Urban Studies Directed Study. (2-3 cr [max 6 cr]; SP–UrBS majors, #, Δ, □; A-F only)
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; SP–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)

Institute of Linguistics and Asian and Slavic 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. (4 cr)
Basic listening, speaking, reading, and writing skills. Emphasizes development of communicative competence.

Urdu 1102. Beginning Urdu. (4 cr; SP–1101 or #)
Basic listening, speaking, reading, and writing skills. Emphasizes development of communicative competence.

Urdu 3131. Intermediate Urdu. (4 cr; SP–1102 or #)
Development of reading, writing, speaking, and listening skills. Grammar review, basic compositions, oral presentations.

Urdu 3132. Intermediate Urdu. (4 cr; SP–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; SP–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; SP–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; SP–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; SP–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.

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. Introduction to Gender Studies. (3-4 cr)
Historical, cultural, psychological, and social dimensions of analyzing gender. How various groups (based on race, class, sexual orientation, region) have different understandings of gender ideals/deviances.

WoSt 1003W. Women and World Literatures. (3-4 cr)
Introduction to concepts in literary studies. Poems, plays, short stories, novels, essays, and letters by women from different parts of the world. Thematic focus on the lives, experiences, and literary expression of women, including exploration of basic concepts of women's studies.

WoSt 1902. Freshman Seminar. (3 cr; QP–Fr or no more than 36 cr; SP–Fr or no more than 36 cr; A-F only)
Topics/description vary. See *Class Schedule, Course Guide*.

WoSt 3001W. Sexuality Studies. (3 cr)
Interdisciplinary survey of lesbian, gay, bisexual, and transgender studies. Includes honors recitation.

WoSt 3002. U.S. Ethnic Studies of Women, Race, and Class. (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: U.S. Ethnic Studies of Women, Race, and Class. (3-4 cr; SP–\$3002; honors)
Comparative study of women/gender, race, class, sexuality in two or more U.S. ethnic cultures. Includes honors recitation.

Course Descriptions

WoSt 3003V. Honors: Women and World Cultures. (3-4 cr; SP-§3003W; 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. Women and World Cultures. (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; SP-§3004W; 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; SP-§3001; A-F only)

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; SP-§3002; A-F only)

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; SP-§3003; A-F only)

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; SP-§3004; A-F only)

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; SP-§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; SP-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. Biology, Race, and Gender. (3 cr; QP-3202; SP-3202)

Ways in which modern biology has been a site of conflict about race and gender. Short survey of the race and 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; SP-§5203; 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. Women and Literature. (3 cr; QP-Intro literature course; SP-Intro literature course)

Literature in various genres (e.g., novels, short stories, poems, essays, plays, autobiography) written by women of various racial and 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. U.S. Women of Color Literatures. (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. Women in U.S. Popular Culture. (3 cr)

Contemporary U.S. feminism as a political and intellectual movement and the ways in which that movement has been represented in popular culture.

WoSt 3307. Gender and 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 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 Studies. (3 cr; SP-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; SP-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. Women and Work. (3 cr; SP-1001 or 1002 or #)

Historical changes in women's labor force participation in the United States from 1890 to present. Systematic and institutional processes that maintain and 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 3408W. Women in Modern America. (3 cr; SP-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 Studies. (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 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; SP-[WoSt major or WoSt minor or 6 cr WoSt] or [#; A])

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; SP-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]; SP-§3880)

Directed instruction.

WoSt 3890H. Topics: Honors Seminar. (1-8 cr [max 12 cr]; SP-§3890; 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]; SP-#, A, □)

WoSt 3993. Directed Study. (1-12 cr [max 12 cr]; SP-#, A, □)

WoSt 3994. Directed Research. (1-12 cr [max 12 cr]; SP-#, Δ, □)

WoSt 4102. Women, Gender, and Science. (3 cr; SP-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; SP-[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; SP-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; SP-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; SP-Sr or grad or #)

Topics specified in *Class Schedule*.

WoSt 4201. The Older Woman: A Feminist Perspective. (3 cr; SP-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; SP-Sr or grad or #)

Topics specified in *Class Schedule*.

WoSt 4301W. Women Writers of Africa and Latin America. (3 cr; SP-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; QP-Sr or grad student or #; SP-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; SP-Sr or grad or #)

Topics specified in *Class Schedule*.

WoSt 4401. Chicana/Latina Cultural Studies. (3 cr; SP-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. History of Western Feminism. (3 cr)

Survey of the main currents in the history of Western feminist thought, politics, and social movements from the 1770s to the present.

WoSt 4403. Lesbian/Queer Cultural Production. (3 cr; SP-3001)

Lesbianism and lesbian identities as products of cultural practices, relations, and meanings that are historically specific and historically changing.

WoSt 4490. Topics: Comparative and Global Studies. (3 cr; SP-Sr or grad or #)

Topics specified in *Class Schedule*.

WoSt 4502. Women and Public Policy. (3 cr; SP-[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; SP-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; SP-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; SP-Jr or sr or grad)

Topics specified in *Class Schedule*.

WoSt 4900. Women's Studies Seminar. (3 cr [max 12 cr]; SP-WoSt major, junior or senior standing, or instructor's permission; A-F only)

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; SP-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; SP-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; SP-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; SP-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; SP-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; SP-§3206; 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; SP-One women's studies course or #; A-F only)

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; SP-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; SP-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; SP-#)

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; SP-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; SP-8 cr WoSt and/or Chic and/or Amln 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]; SP-#)

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)

Intended for students who have an interest in entering the profession or interacting with forest products and paper manufacturing professionals in the future. Study how the industry converts forest resources into products while protecting the source of the raw material.

WPS 1301. Wood as a Raw Material. (3 cr; A-F only)

Physical and chemical nature of wood and wood fiber. Raw material requirements, manufacturing processes, and product characteristics for principal forest products. Examine world wood supply and consumption trends.

WPS 1303. Wood Structure and Identification. (1 cr; QP-1301 or #; SP-1301 or #)

Features of wood structure vital to identifying wood of various tree species and understanding physical properties of wood.

WPS 3305. Fundamentals of Lumber Grading. (1 cr; QP-1301, 1303 or #; SP-1301, 1303 or #)

History, development, and practical application of hardwood and softwood lumber grading methods.

Course Descriptions

WPS 3312. Building Materials Estimating. (1 cr; QP-#; SP-3332)

Modern methods of estimating quantity, grade, and specifications of building materials for light frame construction.

WPS 3332. Introduction to Residential Construction. (2 cr)

Introduction to housing and construction terminology, building materials and components, and the design, construction, and sales process including basic building science concepts, blueprint reading, computer-aided design, and construction site logistics.

WPS 3393. Directed Study Experience. (1-3 cr [max 3 cr]; QP-#; SP-#)

Opportunity to pursue experiences 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; QP-WPS cooperative ed student; SP-WPS cooperative ed student; A-F only)

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. Honor Seminar. (1 cr; QP-WPS upper div honors, #; SP-WPS upper div honors, #; A-F only)
Current topics presented by faculty/students. Lecture/discussion.

WPS 4201. Wood Industry Tours. (1 cr; SP-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; QP-1301 or #; SP-1301 or #)

Basic mechanics and strength of materials as applied to wood products.

WPS 4302. Wood Chemistry. (3 cr; QP-3xxx organic chem course; SP-2xxx organic chem course; A-F only)
Occurrence, biosynthesis, structure, and chemistry of the chief biopolymers and related lower molecular weight components in woody tissues; chemical and biochemical principles of pulping wood and bleaching pulp.

WPS 4303. Wood Deterioration and Preservation. (3 cr; QP-1301 or #; SP-1301 or #)

Deterioration of wood and wood products by bacteria, fungi, insects, marine organisms, fire, and weathering; methods of preservation and preservatives used. Lecture and lab.

WPS 4304. Wood Drying. (2 cr; QP-5300; SP-4303)

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; QP-5300 or #; SP-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; QP-1301 or #, 3300 recommended; SP-1301 or #, 3301 recommended)

Engineering and economic analysis of manufacturing and distribution systems for wood-based products. Material balances, equipment selection, economic analysis, and presentation techniques.

WPS 4307. Wood-Base Panel Technology. (3 cr; QP-5300, 5301 or #; SP-4301, 4309 or #)

Design, manufacture, properties, and applications of structural and nonstructural wood-base panels. Adhesives and their application in the panel industry. Lecture and lab.

WPS 4308. Wood Machining. (2 cr; QP-1301, 1303; SP-1301, 1303; A-F only)

History and fundamentals of wood machining processes. Analysis of tool and workpiece interaction and the effects on recovery efficiencies, tool wear, and surface condition. Application of wood processing systems and technologies. Lectures, demonstrations, field trips.

WPS 4309. Wood-Fluid Relationships. (2 cr; QP-1301; SP-1301 or #)

Moisture in wood and its relationship to density and specific gravity, shrinking and swelling, electrical properties, strength properties, thermoconductivity, absorption isotherms, dimensional stabilization, permeability and diffusion.

WPS 4313. Pulp and Paper Unit Operations. (3 cr; QP-5305, 5312, 5353, CE 3400, ME 3301, ME 5342 or ChEn 5102 or #; SP-4305, ChEn 4001, ME 3321, ME 3322, Math 2263 or #)

Application of the principles of momentum, heat, and mass transfer to unit operations in the pulp and paper industry; fluid transport, filtration, sheet formation, sedimentation, drainage, pressing, heat exchange, evaporation, washing, bleaching, humidification and drying, chemical and energy recovery. Computer simulation of multiple-stage systems.

WPS 4314. Papermaking Processes and Process

Engineering Laboratory. (3 cr; QP-5305, 5310, 5311, 5312, 5315, 5359, CE 3400, ME 3301, ME 5342; SP-4305, 4313, ChEn 4001, ME 3321, ME 3322)

Theory and practice of the design and operation of paper machines and associated finishing and converting equipment. Experiments that illustrate and apply the principles of momentum, heat, and mass transfer. Operation and 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; QP-WPS 5305, 5310, 5311, 5312, 5315, ¶ 5321, CE 3400, ME 3301, ME 5342 or #; SP-WPS 4305, ChEn 4001, ME 3321, ME 3322, Math 2263)

Paper science and engineering senior and graduate students. Concepts, methodology and tools in process simulation, process dynamics and automatic process control.

WPS 4321. Material Science of Paper. (3 cr; QP-5305, 5310, 5311, 5312, 5315, 5359, CE 3400, ME 3301, ME 5342, ¶Chem 5520 or #; SP-4301, 4305, ChEn 4001, Chem 3501, ME 3321)

Advances in understanding response of fibers subjected to various operations of papermaking processes: mechanisms acting in stock preparation, refining, wet-end operations, web consolidation, and drying; analysis of corresponding 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; QP-Jr or sr major or grad or #; SP-Jr or sr in PS&E program or grad or #)

Biological process technology as applied to raw materials, manufacture processes, and product performance in the paper industry. Roles and uses of various microorganisms and enzymes in pulp and paper improvements as well as problems. Environmental impacts related to air and water discharge from papermaking as reflected in overview of 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; QP-#; SP-4301, 4303, 4333)

This course is the foundation of building science theory and advanced applications for residential buildings. Build on previous coursework in building materials and systems with a focus on heat and mass transfer.

WPS 4335. Building Testing and Diagnostics. (2 cr; SP-4333)

Learn the theoretical basis for performance testing and demonstrate practical diagnostics applications for residential structures. Focus on existing structures and retrofit/remedial applications. Specific equipment used includes digital differential pressure gages, blower doors, airflow hoods and grids, duct pressure testing, and infrared thermography. Several hands-on sessions for equipment use and problem solving experience.

WPS 4355. Mechanics and Structural Design with Wood Products. (3 cr; QP-5301; SP-4301 or CE student)

Introduction to the design of wood structures through the study of loads and forces (gravity, seismic, and wind) on structural elements such as wood beams, columns, beam-columns, horizontal diaphragms, and shear walls. Yield limit equations are used to design doweled joints.

WPS 4359. Surface, Colloids, and Coating Processes. (4 cr; QP-5361 or #, Chem 3302, ME 3301, ¶Chem 5520; SP-4305, Chem 3501, ME 3321)

Principles of surface and colloid chemistry applied to basic problems in pulp and paper manufacturing operations and product uses. Coating process and products (primarily paper); theory, techniques, and procedures for formulating and applying coatings; properties and uses of coated products.

WPS 4362W. Pulping and Bleaching. (3 cr; QP-#; SP-4302, 4305)

Designed for paper science and engineering majors to become familiar with chemistry and technologies involved in production of paper-making raw material. Main focus on wood pulping/bleaching including non-wood fibers and recycled fiber materials.

WPS 4364. Process Engineering Design. (2 cr; QP-#; SP-4305, 4306, 4313, ChEn 4001, ME 3321, ME 3322)

Exposure and training for paper science and engineering seniors in solving process engineering related problems and optimization and design of pulp and paper processes. Application of engineering principles in pulp and paper process engineering. Process engineering studies of industrial production systems.

WPS 4401W. Forest Products Marketing. (4 cr; QP-1301; SP-1301; A-F only)

Examine the marketing of forest products including the selling function. Focus on companies that distribute wood-based construction materials. Lecture, discussion, in-class role playing, and extensive use of case studies as well as guest presenters and field trips to local companies.

WPS 4405. Paper in Today's World. (2 cr; QP-5305 (UC/CEE only); SP-4305 [UC only])

Primarily for elementary and secondary school teachers although other interested students may enroll. Enables teachers to prepare a teaching unit on pulp and paper for use in an elementary, junior high, or senior high school science class. Not open to WPS majors.

WPS 4406. Understanding Wood. (1 cr; QP-UC/CEE only; SP-UC only)

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; QP-1301 or 5410 or #; SP-1301 or 4406 or #; A-F only)

Physical/mechanical properties of composites. Proper composite applications/installations. Intended primarily for forest products marketing/manufacturing professionals, architects, and commercial/residential design engineers.

WPS 4491. Senior Topics (Independent Study). (1-4 cr; QP-Sr, #; SP-Sr, #)

Independent study in an area of interest to an undergraduate majoring in one of the fields within the College of Natural Resources.

WPS 4801H. Honors Research. (2 cr; QP–WPS upper div honors, #; SP–WPS upper div honors, #; A-F only)
First semester of independent research project supervised by faculty member.

WPS 4802H. Honors Research. (2 cr; QP–WPS upper div honors, #; SP–WPS upper div honors, #; A-F only)
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 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 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 Vocational Education. (2 cr; A-F only)
Purposes, recipients, practices, legislation and funding, socioeconomic contexts of work, community, and family 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. Nonformal Education in Youth-Serving Organizations. (3 cr; A-F only)
Examination of the 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 in Youth Development Leadership. (1 cr [max 4 cr]; S-N only)
Applies the principles of healthy youth development, nonformal learning venues, and experiential education to the practice and policies of community-based youth

work. Individual and group projects focus on applied research, community-based teaching and learning, and foundations of ethical practice. Four-course sequence.

WCFE 5496. Leadership Field Experience: Youth Development. (3 cr; S-N only)
Field experience to demonstrate leadership in support of healthy youth development. Work in agency dedicated to community-based youth programming, education, public policy, and advocacy for children, youth, and 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 5696. Teaching Internship: Introduction. (1 cr; SP–Admission to an init lic program; S-N only)
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; SP–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]; SP–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; SP–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 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]; SP-Δ)

Self-directed study, with faculty advice, in areas not covered by regular courses.

YoSt 3101. Introduction to Youth Work. (2 cr; QP-1 gen psy and 1 gen soc course; SP-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 5031. Youth in the World. (3 cr; QP-Upper div AdPy course; SP-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; QP-Courses in ed psych or child or adolescent psych; SP-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; QP-3100, 5330, #; SP-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; QP-5201, 5330, #; SP-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; QP-5201, 5202, #; SP-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; QP-5201, 5202, #; SP-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; QP-Two soc/anth courses, work exper in a youth agency or org; SP-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; QP-Two social sci courses, exper working with youth or #; SP-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]; QP-Two social sci courses, exper working with youth or #; SP-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; QP-Two social sci courses, exper working with youth or #; SP-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]; QP-#; SP-#)

Independent reading and/or research under faculty supervision.

YoSt 5301. Communicating with Adolescents About Sexuality. (2 cr; QP-Upper div AdPy course, exper working with youth or #; SP-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; QP-Two social sci courses, exper working with youth or #; SP-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 "life space" in everyday life, rather than in one-to-one office-based interactions.

YoSt 5321. Work with Youth—Individual. (2 cr; QP-5330 or equiv or #; SP-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; QP-5230 or equiv or #; SP-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; QP-5230 or 5330 or #; SP-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; QP-Two social sci courses, exper working with youth or #; SP-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.

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 3001. Introduction to Youth, Youth Development, and Youth Work. (3 cr; SP-Soc 1001, Psy 1001, 2001; A-F only)

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; SP-Soc 1001, Psy 1001, 2001, ¶3001, ¶3003; A-F only)

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; SP-Psy 1001, Soc 1001, 2001, ¶3001, ¶3002; A-F only)

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; SP-3001, ¶3005, ¶3006; A-F only)

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; SP-3001, ¶3004, ¶3005; A-F only)

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; SP-3001, 3006; A-F only)

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.

Faculty and Administration

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* *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

Patricia B. Spence, Rice, Chair
 Maureen K. Reed, Stillwater, Vice Chair
 Anthony R. Baraga, Side Lake
 Robert S. Bergland, Roseau
 Dallas Bohnsack, New Prague
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 Warren C. Larson, Bagley
 David R. Metzzen, Sunfish Lake
 H. Bryan Neel III, Rochester
 Michael O'Keefe, Minneapolis
 William R. Peterson, Eagan
 Jessica J. Phillips, Minneapolis

University Administrators

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 McKinley Boston, Jr., Vice President for Student Development
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 Charles Muscoplat, Vice President for Agricultural Policy
 Mark B. Rotenberg, General Counsel

College of Agricultural, Food, and Environmental Sciences

Administration

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 Alan G. Hunter, Associate Dean, Curricular and Student Affairs
 Gerald Miller, Associate Dean, Extension
 Beverly Durgan, Assistant Dean
 Richard Swanson, Assistant Dean, and Director of International Agricultural Programs
 Jean Underwood, Director, Career Services
 Mark Bultmann, Director, Student Services
 Stacie Dossdall, Admissions Coordinator

■ Agricultural, Food, and Environmental Education

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 Teacher and trainer preparation, instructional preferences, instructional design

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 Teacher preparation, teaching methods, curriculum development, rural leadership

■ Agronomy and Plant Genetics

Anderson, James A., Assistant 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 management strategies in annual and perennial systems

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
 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

Dyck, Elizabeth A., Assistant Professor
 Ph.D., University of Maine
 Crop/weed ecology

Ehlke, Nancy Jo, Professor
 Ph.D., Pennsylvania State University
 Forage, legumes and turf grasses, genetics, breeding methods

Elling, J. Laddie, Professor Emeritus
 Ph.D., University of Minnesota
 Plant genetics/plant pathology

Forcella, Frank, Associate Professor
 Ph.D., University of Oklahoma
 Integrated ecology and management of weeds

Geadelmann, Jon Lee, Adjunct Professor
 Ph.D., Iowa State University
 Corn breeding and genetics

Gengenbach, Burt G., Professor
 Ph.D., University of Illinois
 Corn and soybeans molecular genetics

Gooding, 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

Gunsolus, Jeffrey L., Associate Professor
 Ph.D., North Carolina State University
 Weed management in corn and soybeans

Hardman, Leland L., Professor
 Ph.D., University of Minnesota
 Cropping practices for soybeans, field beans, and oats

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, Hebert 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 biology to agricultural problems

Jung, Hans-Joachim G., Professor
 Ph.D., University of Illinois
 Cell wall lignification of forages

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 Forage 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
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 Soybean genetics and breeding

Peterson, Paul R., Assistant Professor
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Phillips, Ronald L., Regents Professor
 Ph.D., University of Minnesota
 Crop cytogenetics

Porter, Paul, Associate Professor
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 Cropping systems

Rasmusson, Donald C., Professor
 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
 Crop molecular genetics, genetic engineering

Stucker, Robert E., Professor Emeritus
 Ph.D., North Carolina State University

Stuthman, Deon D., Professor
 Ph.D., Purdue University
 Durable and disease-resistant oats, plant improvement, value-added traits

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

Faculty and Administration

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, Hang, 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

Epley, Richard J., Professor
Ph.D., University of Missouri
Meat science

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

Johnson, Dennis G., Professor
Ph.D., University of Minnesota
Dairy production systems

Johnston, Lee J., Associate 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

Osborn, John W., Professor
Ph.D., Medical College of Wisconsin
Physiology and neuroscience

Otterby, Donald E., Professor Emeritus
Ph.D., North Carolina State University
Dairy cattle nutrition and management

Ponce De León, F. Abel, Professor and 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

Steuernagel, Gerald, Professor and Extension Educator
Ph.D., University of Minnesota
Dairy information management

Waibel, Paul E., Professor Emeritus
Ph.D., University of Wisconsin, Madison
Turkey 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

Coggins, Jay S., Associate Professor
Ph.D., University of Minnesota
Resource and environmental economics, political economy

Crewdson, Buddy G., Associate Professor
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, agriculture

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 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 logistic

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, Assistant 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

Homans, Frances R., Assistant Professor
Ph.D., University of California
Resource economics

Houck, James P., Professor
Ph.D., University of Minnesota
Agricultural prices, policy, and trade

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

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., Associate 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

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 Chair and 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
Ph.D., University of Illinois
Grain marketing

Stinson, Thomas F., Assistant 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
M.A., University of Minnesota
Public policy education, local government, public finance

■ *Biosystems and Agricultural Engineering*

Bhattacharya, Mrinal, Professor and Director of Graduate Studies
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., Associate 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

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 and Extension Engineer
Ph.D., Purdue University
Livestock housing, odor control, air quality, biofiltration

Morey, R. Vance, Professor and Head
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, Associate Professor and Director of Undergraduate Studies
Ph.D., University of Illinois
Food engineering, value-added processing, MRI (magnetic resonance imaging) and NMR (nuclear magnetic resonance) applications

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

Subramanian, Anuradha, Assistant Professor
Ph.D., Virginia Polytechnic Institute and State University
Recombinant protein production in transgenic animal systems, downstream purification

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 Head
Ph.D., Pennsylvania State University
Floricultural entomology

Brooks-Wallace, Marion, Professor Emeritus
Ph.D., University of Minnesota
Insect physiology

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, mosquito reproduction

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., Associate Professor
Ph.D., University of Wisconsin, Madison
Integrated pest management for vegetable crops

Krischik, Vera A., Assistant 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., Associate Professor
Ph.D., University of Oregon
Neural mechanisms underlying the generation of behavior in arthropods and annelids

Miller, William E., Professor
Ph.D., Ohio State University
Population biology; reproductive biology; Lepidoptera systematics and evolution

Moon, Roger D., Professor
Ph.D., University of California, Davis
Livestock entomology, biological control, sampling

Noetzel, David M., Professor Emeritus
M.S., University of Minnesota
Field and specialty crops pest management

Ostle, 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
Potato pest management

Ragsdale, David W., Professor
Ph.D., Louisiana State University
Integrated pest management and biological control of insect

Seybold, Steven, Assistant Professor
Ph.D., University of California
Forest entomology

Spivak, Marla S., Associate Professor
Ph.D., University of Kansas
Apiculture and social insects

Walgenbach, David, Professor
Ph.D., University of Wisconsin
Agricultural entomology and pest management

Weller, Susan J., Assistant 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

Asp, Elaine H., Associate Professor Emeritus
Ph.D., University of Minnesota
Physical and chemical characteristics of cereals, cereal-based products

Brady, Linda J., Professor
Ph.D., Michigan State University
Effects of diet on intestinal microflora and health

Busta, Francis F., Professor
Ph.D., University of Illinois
Factors affecting survival/growth of bacteria in food

Cartwright, Yolanda, Assistant Clinical Specialist
M.Sc., R.D. L.D., Rush University
Nutrition education, epidemiology and minority populations

Csallany, A. Saari, Professor
D.Sc., University of Technical Science, Budapest
Lipid chemistry/nutritional biochemistry, free radicals, oxidative degradation

Darling, Mary E., Assistant Professor
Ph.D., University of Minnesota
Community nutrition, cross-cultural nutrition education, nutrition for the elderly

Diez-Gonzalez, Francisco, Assistant Professor
Ph.D., Cornell University
Food-borne pathogens, food contamination prevention methods

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, Australia
Structure/function relationships in cereal grains/cereal products

Gallaher, Daniel D., Associate Professor
Ph.D., University of California, Davis
Diet/colon cancer relationships, fat/fiber in diet

Hanson, Madge N., Program Director
M.S., R.D., L.D., University of Minnesota
Medical nutrition therapy

Hassel, Craig A., Associate Professor
Ph.D., University of Arizona
Saturated fatty acids/dietary fiber on cholesterol metabolism

Hutchins, Andrea M., Assistant Clinical Specialist
M.S., R.D. L.D., University of Minnesota
Nutrition support, nutrition education, medical nutrition therapy, phytoestrogens

Kurzer, Mindy S., Associate 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, edible packaging films, moisture transport

McKay, Larry Lee, Professor
Ph.D., Oregon State University
Food fermentation/genetics/biotechnology of lactic acid bacteria

Faculty and Administration

- Mullan, Jr., Louise M., Assistant Professor**
M.S., R.D., L.D., Iowa State University
Acceptability and consumption of foods in institutional settings
- O'Sullivan, Daniel J., Associate Professor**
Ph.D., National University of Ireland
Molecular genetics of lactic acid bacteria, bacteriophage resistance
- Parks, Elizabeth J., Assistant Professor**
Ph.D., University of California, Davis
Alterations in glucose and fat metabolism in human disease states
- Reicks, Marla M., Associate Professor**
Ph.D., Iowa State University
Role of diet in cancer prevention, nutrition education
- 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
- Schmidl, Mary K., Adjunct Professor**
Ph.D., Cornell University
Food chemistry, biochemistry, human nutrition
- Slavin, Joanne L., Professor**
Ph.D., University of Wisconsin, Madison
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, Madison
Effects of technology/new ingredients on dairy products
- Tatini, Sita R., Professor**
Ph.D., University of Minnesota
Control of food-borne pathogens, natural antimicrobials
- Vickers, Zata M., Professor**
Ph.D., Cornell University
Pleasantness/acceptability of foods, attributes and food preferences
- Warthesen, Joseph, Professor and Head**
Ph.D., Oregon State University
Chemical reactions in food and food analysis, food processing storage
- Willson, Karl S., Lecturer**
M.S., Michigan State University
Food packaging, packaging technology
- **Horticultural Science**
- Anderson, Neil O., Assistant Professor**
Ph.D., University of Minnesota
Floriculture breeding and genetics
- Ascher, Peter D., Professor**
Ph.D., University of Wisconsin, Madison
Genetics/floriculture
- Becker, Roger L., Associate Professor**
Ph.D., Iowa State University
Weed management
- Brown, Deborah L., Professor**
M.S., University of Minnesota
Consumer horticulture, communications
- Carter, John V., Professor**
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/oramentals
- 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 and Head**
Ph.D., Harvard University
Growth regulation
- 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
- Hoover, Emily E., Professor**
Ph.D., University of Minnesota
Fruit science, director of educational programs, Minnesota Landscape Arboretum
- 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 Hockenberr, Assistant 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., Associate 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**
Ph.D., Iowa State University
Woody landscape, plant breeding
- Rosen, Carl J., Professor**
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., Assistant Professor**
M.S., University of Minnesota
Extension horticulture
- **Plant Pathology**
- Anderson, Neil A., Professor Emeritus**
Ph.D., University of Minnesota
Genetics of plant pathogens
- Anikster, Yehoshua, Associate Professor**
Ph.D., Tel Aviv University
Biology of rust fungi from cereal crops
- Banttari, Earnest E., Professor Emeritus**
Ph.D., University of Minnesota
Virus, mycoplasma diseases: potato and small grain diseases
- Behrendt, Chad J., Extension Education and Assistant Professor**
Ph.D., University of Wisconsin
Disease prevention in urban landscape plants
- Blanchette, Robert A., Professor**
Ph.D., Washington State University
Forest pathology, deterioration of wood products
- Borlaug, Norman E., Professor Emeritus**
Ph.D., University of Minnesota
1970 Nobel Peace Prize for the "Green Revolution"
- Bushnell, William R., Professor Emeritus**
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, Assistant 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., Associate 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., Associate Professor**
Ph.D., University of Wisconsin, Madison
Epidemiology and microbial ecology
- 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**
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
- McVey, Donald V., Associate Professor**
Ph.D., University of Illinois
Cereal rust diseases
- Miller, Jeffrey S., Assistant Professor**
Ph.D., Washington State University
Etiology and management of potato diseases
- 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 mycohericides
- Percich, James A., Professor**
Ph.D., Michigan State University
Plant disease management: wild rice and vegetables
- Pfleger, Francis L., Professor and 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

Stienstra, Ward C., Professor Emeritus
Ph.D., Michigan State University
Soybean corn turf and fruit disease management

Szabo, Les J., Assistant 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
Video, professional and technical writing

Bennett, J. Michael, Professor Emeritus
M.A.E., University of Florida
Reading and communication

Brown, James, I., Professor Emeritus
Ph.D.
Reading

Connolly, James E., Professor Emeritus
Ph.D., University of Minnesota
Speech and managerial communication

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

Gross, Alan G., Professor
Ph.D., Princeton University
Rhetorical study of history of the pre-scientific article

Gurak, Laura J., Associate Professor
Ph.D., Rensselaer Polytechnic Institute
Rhetoric of science and technology, intellectual property

Holloway, James R., Professor Emeritus
D.S., Sioux Falls College
Speech

Horberg, Richard O., Professor Emeritus
Ph.D., University of Minnesota
Creative writing

Kastman Breuch, Lee-Ann, Assistant Professor
Ph.D., Iowa State University
Communication pedagogy

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

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

Mikelonis Victoria M., Professor
Ph.D., Indiana University of Pennsylvania
Intercultural communication, design of training materials

Nichols, Ralph G., Professor Emeritus
Ph.D.
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

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

Wahlstrom, Billie J., Professor
Ph.D., University of Michigan
Virtual reality education—modules for distance delivery

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, 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., Associate 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 and Head
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

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

Lamb, John A., Associate 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
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., Assistant Professor
Ph.D., North Carolina State University
Soil management

Strock, Jeffrey S., Assistant Professor
Ph.D., North Carolina State University
Soil management and fertility

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

Krista Bergert, Coordinator, External Relations

Susan Bretheim, Development Officer

Craig Johnson, Curator and Coordinator, Academic Resources

Richard Schunn, Technology Director

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, Lecturer
M.Arch., Southern California Institute of Architecture
Design

Albertsson, Christine, Adjunct Assistant Professor (R.A.)
M.Arch., University of Pennsylvania
Residential design

Anderson, Lee, Associate Professor
Director of Graduate Studies, Department Head
M.Arch., University of Minnesota
Computer aids to design conception and presentation

Bergert, Douglas, Lecturer
M.Arch., Harvard University
Design

Berkovskaya, Olga, Lecturer
M.Arch., University of Minnesota
Representation

Blankfard, Nancy, Lecturer
B.Arch., Tulane University
Design

Blanski, William, Lecturer (A.I.A.)
M.Arch., Yale University
Design, construction technology, architectural drawing

Buetow, Steve, Lecturer (A.I.A.)
B.Arch., University of Minnesota
Residential and historical architecture

Faculty and Administration

- Carmody, John, Senior Research Fellow**
M.Arch., University of Minnesota
Technology
- Carney, Brian, Lecturer**
M.Arch., Harvard University
Design
- Caliandro, Victor, Adjunct Assistant Professor**
M.S., Columbia University
Design
- Chen, Arthur, Associate Professor**
Ph.D., Georgia Institute of Technology
Architectural thinking, drawing, urbanism
- Christensen, Michael, Lecturer**
M.Arch., University of Minnesota
Design, CAD
- Conway, William, Associate Professor and Department Head (A.I.A.)**
M.Arch., Yale University
Design
- Dayton, Megan, Lecturer**
M.Arch., University of Virginia
Design, representation
- deLaittre, Mary, Lecturer**
M.Arch., University of Minnesota
Urban design, neighborhood development
- Dimond, David, Lecturer (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
- Dozier, James, Lecturer**
B.Arch., Rice University
AutoCAD, design visualization, electronic imaging
- Ebbighausen, Nina, Lecturer**
B.Arch., Syracuse University
Design
- Ferguson, Robert, Adjunct Assistant Professor**
M.Phil., Pembroke College of Cambridge
History and philosophy, design
- Fisher, Thomas, Professor**
M.I.S., Case Western Reserve University
Writing/communication, architectural criticism
- Franck, Bruno, Adjunct Associate Professor**
Ph.D., University of Minnesota
Architectural structure, wood architecture
- Fuller, Timothy, Adjunct Assistant Professor**
M.Arch., University of Minnesota
Urban design, residential design and construction
- Gilpin, Dawn, Lecturer**
M.Arch., Southern California Institute of Architecture
Design
- Guzowski, Mary, Associate Professor**
M.Arch., University of Washington
Environmental technology, sustainable design
- Hansen, Todd, Lecturer**
M.Arch., University of Pennsylvania
Design
- Heshmati, Ali, Adjunct Assistant Professor**
B.Arch., University of Minnesota
Design
- Jacques, Tracey, Lecturer (A.I.A.)**
B.Arch., University of Minnesota
Representation
- James, Vincent, Adjunct Associate Professor (A.I.A.)**
M.Arch., University of Wisconsin, Milwaukee
Building design and construction
- Jara, Cynthia, Associate Professor (R.A.)**
M.A., M.Arch., Columbia University
Design theory: historic reference
- Kiewel, Harold, Lecturer (R.A.)**
M.Arch., University of Minnesota
Accessibility
- Krall, Carolyn, Lecturer (A.I.A.)**
B.S., California State Polytechnic University, Pomona
Professional practice, design process
- LaDouceur, Janis, Adjunct Assistant Professor (A.I.A.)**
M.Arch., University of Wisconsin, Milwaukee
Design
- Lammers, James, Lecturer (F.A.I.A.)**
M.S., Columbia University
Design for health care, real-estate development
- 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, Lecturer**
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, Lecturer**
M.Arch., University of Minnesota
Design
- McQuade, Martha, Lecturer**
M.Arch., University of Minnesota
Design, representation
- § Meyer, Thomas, Adjunct Associate Professor (A.I.A.)**
B.Arch., University of Minnesota
Renovation adaptive re-use, residential design
- 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, wall sections
- Orton, Charles, Lecturer**
M.Arch., Yale University
Representation
- Parker, B. Aaron, Adjunct Assistant Professor (A.I.A.)**
M.S., Columbia University
Architectural design, urban design
- Peterssen, Lars, Adjunct Assistant Professor**
M.Arch., University of Minnesota
Computers, design
- Piotrowski, Andrzej, Associate Professor (R.A.)**
M.I.Arch., Politechnika Warszawska, Poland
Visual studies, design, theory
- Porycky, Anna, Lecturer**
M.Arch., University of Minnesota
Representation
- Potts, Kenneth, Lecturer (A.I.A.)**
M.Arch., University of Minnesota
Design
- Quigley, Timothy, Adjunct Assistant Professor (A.I.A.)**
M.Arch., University of Minnesota
19th- and 20th-century architecture, design
- Remington, Todd, Lecturer (A.I.A.)**
M.Arch., University of Minnesota
Design/build, philosophical premises
- 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, Ian, Lecturer**
B.Arch., Iowa State University
Design
- § Snow, Julie, Adjunct Associate Professor (F.A.I.A.)**
B.Arch., University of Colorado
Design, practice, construction
- § Solomonson, Katherine, Associate Professor**
Ph.D., Stanford University
American and contemporary architecture
- Srivastive, Malini, Lecturer**
M.Arch., University of Minnesota
Design, CAD
- 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-related systems and materials, monastic architecture
- Valdes, Marcelo, Lecturer**
M.Arch., University of Minnesota
Design
- Watson, Gregory, Adjunct Associate Professor (R.A.)**
M.Arch., Washington University
Design
- § Weeks, J. Stephen, Associate Professor (R.A.)**
B.Arch., University of Minnesota
Building materials and methods, masonry design
- Weiner, Sara, Lecturer (R.A.)**
M.Arch., University of Minnesota
Art, architecture
- Weinstein, Joshua, Lecturer (R.A.)**
B.Arch., Pratt Institute
Architectural and environmental design, hands-on approach to building
- 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
- Whitcomb, Thomas, Lecturer**
B.Arch., University of Minnesota
Design, architectural practice, modern architectural history
- 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

■ 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
- 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, Kathie, 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
- Halunen, Todd, Teaching Specialist (A.S.L.A., R.L.A.)**
B.L.A., North Dakota State University
Design
- 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
- § Martin, Roger B., Professor Emeritus (F.A.S.L.A., R.L.A.)**
M.L.A., Harvard University
Design research, design education
- Murphy, Jr., Richard, 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

**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

**Morrish, William R., Director, Professor,
Dayton-Hudson Chair in Urban Design
(R.A.)**
M.A.U.D., Harvard University
Urban design, planning, sustainable design

College of Biological Sciences

Administration

Robert P. Elde, Dean

**Judson D. Sheridan, Associate Dean for
Research**

Kathryn L. Hanna, Associate Dean

**Verna L. Holoman, Coordinator of
Recruitment and Retention in the Life
Sciences**

**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
Structure and regulation of human
thrombospondin 2 and thrombospondin
3 genes

Allewell, Norma M., Professor
Ph.D., Yale University
Protein structure, function, design;
mechanisms of biological regulation

***§ 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
Ph.D., Loyola of Chicago
Protein design, structure and function,
X-ray crystallography

Barry, Bridgette A., Professor
Ph.D., University of California, Berkeley
Photosynthetic membrane proteins

**§ Bernlohr, David A., Distinguished
McKnight University Professor**
Ph.D., University of Illinois, Urbana
Metabolic control and gene regulation,
obesity/insulin action, lipid metabolism

Bloomfield, Victor A., Professor
Ph.D., University of Wisconsin, Madison
Molecular biophysics, structure and
dynamics of DNA and proteins

**Conti-Fine, Bianca M., Distinguished
McKnight University Professor**
M.D., University of Milano, Italy
Molecular immunology, molecular
medicine

Das, Anath, Professor
Ph.D., University of Nebraska, Lincoln
Trans-kingdom DNA transfer: plant-
microbe interactions

Dempsey, Mary E., Professor
Ph.D., University of Minnesota
Lipoprotein, cholesterol and protein
chemistry

Flickinger, Michael C., Professor
Ph.D., University of Wisconsin, Madison
Biocatalysis, starvation-induced gene
expression, immunoglobulin synthesis,
ceramic bioseparation

Fuchs, James A., Professor
Ph.D., Texas A&M University, College
Station
Gene regulation, protein structure-function
relationships, metabolic regulation

Hogenkamp, Harry P.C., Professor
Ph.D., University of California, Berkeley
Nucleotide metabolism, ribonucleotide
reduction and thymidylate synthesis

*** 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 structure, metalloproteins

Koerner, James F., Professor
Ph.D., Iowa State University
Neurotransmitters, neuronal signaling

Lange, Alex J., Assistant Professor
Ph.D., Cornell University
Therapeutic intervention in diabetes using
carbohydrate metabolism enzymes

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

Louis, Charles F., Professor and Head
D.Phil, Oxford University, England
Intracellular calcium regulation, cell-to-
cell communication, swine genome
mapping

Lovrien, Rex E., Professor
Ph.D., University of Iowa
Bioseparations, biorecognition, energetics,
proteins and enzymology

Mayo, Kevin H., Professor
Ph.D., University of Massachusetts
Cell adhesion, protein-protein/
carbohydrate interactions

Murphy, Sharon E., Assistant Professor
Ph.D., University of Colorado
Carcinogen metabolism and exposure

Nelstuen, Gary L., Professor
Ph.D., University of Minnesota
Protein-membrane interactions, enzyme
regulation

Oegema, Theodore R., Jr., Professor
Ph.D., University of Michigan
Proteoglycan and extracellular matrix
function

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 signaling

Rafferty, Michael A., Professor
Ph.D., National University of Ireland,
Galway
Neuronal receptors, synaptic transmission

Roon, Robert J., Associate Professor
Ph.D., University of Michigan
Protein and neurochemistry

**Sanders, Michael M., Associate
Professor**
Ph.D., University of Michigan
Eucaryotic molecular biology, hormone
action, gene expression

**Schmidt-Dannert, Claudia, Assistant
Professor**
Ph.D., University of Braunschweig,
Germany
Metabolic engineering, molecular
evolution

**§ Schottel, Janet L., Professor and
Associate Head**
Ph.D., Washington University
mRNA stability, plant-pathogen
interactions, gene expression

Sheaff, Robert J., Assistant Professor
Ph.D., University of Colorado, Boulder
Eukaryotic cell cycle control

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 Head**
Ph.D., Michigan State University
Nutritional and hormonal regulation of
mammalian gene expression

Tsong, Tian Y., Professor
Ph.D., Yale University
Physical biochemistry and protein-folding
mechanism, energy transduction by ion
pump

Van Ness, Brian G., Professor
Ph.D., University of Minnesota
Molecular immunology, gene expression,
lymphoid cancers

Wackett, Lawrence P., Professor
Ph.D., University of Texas, Austin
Biodegradation, dehalogenases,
enzymology in environmental
detoxification and organic synthesis

*** Woodward, Clare K., Professor**
Ph.D., Rice University
Protein biophysics, protein folding and
stability, protein dynamic structure

■ *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., Associate Professor**
Ph.D., Indiana University
History and philosophy of biology

Birney, Elmer C., Professor
Ph.D., University of Kansas
Mammalian evolution and ecology

Corbin, Kendall W., Professor
Ph.D., Cornell University
Evolutionary ecology and genetics, and
biochemical systematics

Cotner, James B., Assistant Professor
Ph.D., University of Michigan
Biological limnology and oceanography,
biogeochemistry, and 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
Ph.D., Harvard University
Paleoecology, paleolimnology, and forest
community ecology

Dean, Anthony M., Assistant Professor
Ph.D., Washington University School of
Medicine
Population biology

**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

**Lanyon, Scott M., Associate 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

McKinney, D. Frank, Professor Emeritus
Ph.D., University of Bristol, England
Animal behavior

McNaught, Donald, Professor Emeritus
Ph.D., University of Wisconsin
Zooplankton ecology, Great Lakes
limnology, and 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
Assistant 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

**Pusey, Anne E., Distinguished
McKnight University Professor**
Ph.D., Stanford University
Animal behavior

Faculty and Administration

Regal, Philip J., Professor
Ph.D., University of California, Los Angeles
Evolution, physiological ecology and behavior, and herpetology

Schmid, William D., Professor
Ph.D., University of Minnesota
Comparative physiology and ecology

Shaw, Ruth, Associate 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
Experimental games, spatially explicit models of feeding behavior

Sterner, Robert W., Professor and Head
Ph.D., University of Minnesota
Limnology: plankton ecology, food webs, and aquatic biogeochemistry

Tester, John R., Professor Emeritus
Ph.D., University of Minnesota
Vertebrate ecology and ecosystem ecology

Tilman, G. David, Distinguished McKnight University Professor
Ph.D., University of Michigan
Experimental and theoretical population, and community ecology

Tordoff, Harrison B., Professor Emeritus
Ph.D., University of Michigan
Systematic and evolutionary biology, and ornithology

Underhill, James C., Professor Emeritus
Ph.D., University of Minnesota
Ichthyology

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., Assistant Professor
Ph.D., University of Wisconsin, Madison
Role of transcription factors in cancer

Bauer, G. Eric, Professor
Ph.D., University of Minnesota
Pancreatic islet physiology and islet adhesion molecules

Berman, Judith G., Associate Professor
Ph.D., Weizmann Institute of Science
Chromosomes and chromosomal elements

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

Conklin, Kathleen F., Associate Professor
Ph.D., Tufts University
Molecular requirements for tumor induction

Coucovanis, Electra, Assistant Professor
Ph.D., Stanford University
Cell death, differentiation, and lineage specification

***§ Cunningham, William P., Professor**
Ph.D., University of Texas, Austin
Conservation biology, land-use issues, environmental ethics

Ekker, Stephen C., Assistant 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 and Head
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

Hamilton, David W., Professor
Ph.D., Cambridge University
The sperm plasma membrane

Hays, Thomas S., Associate Professor
Ph.D., University of North Carolina
Function 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 mechanisms

King, Richard A., Professor
Ph.D., Minnesota, M.D., Jefferson Medical
Genetic regulation of melanin pigmentation

Kirkpatrick, David T., Assistant Professor
Ph.D., Massachusetts Institute of Technology
Recombination and genome stability in yeast

Kuriyama, Ryoko, Professor
Ph.D., University of Tokyo
Mitosis and cell division 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
Cell signaling and adhesion in early vertebrate development

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 signaling and dorsal-ventral patterning in *Drosophila*

Orr, Harry T., Professor
Ph.D., Washington University
Molecular genetics of mammalian development

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., and 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

***§ Snustad, D. Peter, Professor**
Ph.D., University of California, Davis
Components of the cytoskeleton in *Arabidopsis*

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
Cellular function of unconventional myosins

Van Ness, Brian G., Professor
Ph.D., University of Minnesota
Molecular immunology

Zarkower, David A., Assistant 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., Associate 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

Gant, 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

*** 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

May, Georgiana, Associate Professor
Ph.D., University of California, Berkeley
Evolution of fungi, interactions with plants and their mating systems

McLaughlin, David J., Professor
Ph.D., University of California, Berkeley
Evolution and systematics of fungi, especially basidiomycetes

Olzewski, Neil E., Associate Professor
Ph.D., University of Minnesota
Molecular mechanisms of hormone action, molecular genetics of DNA viruses

*** Soulen, Thomas K., Associate Professor**
Ph.D., University of Wisconsin, Madison
Metabolic aspects of plant development, control of duckweeds

Wetmore, Clifford M., Professor
Ph.D., Michigan State University
Lichen floristics and air pollution studies

§ Wick, Susan M., Professor
Ph.D., Stanford University
Plant cell biology and plant development

■ Biological Process Technology Institute

Brooker, Robert J., Professor
Ph.D., Yale University
Molecular biology of the lactose permease

Dean, Antony M., Assistant 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

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., Associate 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
Photosynthetic membrane proteins

Berman, Judith G., Associate Professor
Ph.D., Weizmann Institute of Science
Chromosomes and chromosomal elements

Brambl, Robert M., Professor
Ph.D., University of Nebraska
Function of chaperone proteins and regulation of gene expression

Das, Anath, Professor
Ph.D., University of Nebraska, Lincoln
Trans-kingdom DNA transfer: plant-microbe interactions

Gant, 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

Olszewski, Neil E., Associate Professor
Ph.D., University of Minnesota
Molecular mechanisms of hormone action, molecular genetics of plant 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

§ Schottel, Janet L., Professor
Ph.D., Washington University
mRNA stability, plant-pathogen interactions, gene expression

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
Components of the cytoskeleton in *Arabidopsis*

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 N₂ fixation and N assimilation: plant molecular adaptations to phosphorus stress and functional genomics of Medicago

Young, Nevin D., Professor and Director
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 Feifer, 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*

Bey, Russell, Associate Professor
Ph.D., University of Minnesota
Pathogenic mechanisms and immunology

Cleary, P. Patrick, Professor
Ph.D., University of Rochester, New York
Molecular genetics of streptococcal cell-surface antigens

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., Professor and 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

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 *Clostridium*

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 staphylococcal and streptococcal pyrogenic toxins

Sherman, David H., Associate 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

Zissler, James F., Professor
Ph.D., University of Rochester, New York
Microbial genetics

■ Department of Neuroscience—Medical School

Amirikian, Bagrat, Assistant Professor
Ph.D., Moscow State University
Neural networks and motion

Ashe, James, Associate Professor
M.D., Washington University School of Medicine
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 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

Flanders, Martha, Associate 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, Jr., Glenn J., 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 somesthesia, 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

McLoon, Steven C., Professor
Ph.D., University of Illinois, Chicago
Development and regeneration of axonal connections

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 cognitive-motor behavior

Poppele, Richard E., Professor
Ph.D., University of Minnesota
Neurophysiology and motor control

Seybold, Virginia S., Professor
Ph.D., University of Minnesota
Neuroanatomy, neuropharmacology, pain, autonomic nervous system, neuroendocrines

Faculty and Administration

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

Michael J. Till, D.D.S., Ph.D., 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

§ Ingebritson Ellefson, Marilyn H., R.D.H., Clinical Dental Specialist
M.A., University of Minnesota
Preclinical/clinical dental hygiene, patient counseling, continuing education

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, preclinical 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

Fred N. Finley, Chair, Department of Curriculum and Instruction

To be announced, Chair, Department of Educational Psychology

James C. Hearn, Chair, Department of Educational Policy and Administration

Jane E. Plihal, Chair, Department of Work, Community, and Family Education

Michael G. Wade, Director, School of Kinesiology and Leisure Studies

Ann S. Masten, Director, Institute of Child Development

Faculty

■ Curriculum and Instruction

Avery, Patricia, Associate 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

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., The Ohio State University
Elementary education, social studies education

DiBlasio, Margaret, Associate Professor
Ph.D., The Ohio State University
Art education

Finley, Fred, Associate Professor
Ph.D., Michigan State University
Science education, environmental education

Freedman, Kerry J., Professor
Ph.D., University of Wisconsin, Madison
Curriculum studies, art 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

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
Teacher education, 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

Manning, John, Professor
Ed.D., Boston University
Elementary education, literacy education

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., The 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

§ Bagley, Ayers L., Professor
Ph.D., Indiana University
History and philosophy of education, iconography of education

Chapman, David C., Professor
Ph.D., Syracuse University
Educational development, program evaluation, education policy

§ Cogan, John J., Professor
Ph.D., The 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

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

Louis, Karen Seashore, Professor
Ph.D., Columbia University
Organizational theory, planned change, schools as workplaces, leadership and administration

Matheny, Timothy, Assistant Professor
Ph.D., University of Michigan
State policymaking, business and education reform

§ 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

Stout, Karen Evans, Assistant Professor
Ph.D., University of Minnesota
Instructional leadership, educational policy and instructional practice, developmental contexts

Turner, Caroline Sotello Viernes, Associate Professor
Ph.D., Stanford University
Higher education administration and policy analysis, organizational studies

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

Hummel, Thomas J., Professor
Ph.D., Ohio University
Computer applications, experimental design as applied to counseling research

§ McCarthy Veach, Patricia, Professor
Ph.D., The Ohio State University
Counseling process and self-disclosure research, practica, supervision, and counseling

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

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

Goh, Michael, Assistant Professor
Ph.D., University of Minnesota
Career development

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

Herting Wahl, Kay, Assistant Professor
Ed.D., University of South Dakota
Counseling, educational psychology

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., The 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

Symons, Frank, Assistant Professor
Ph.D., Vanderbilt University
Education and human development, special 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., The Ohio State University
Deaf/hard-of-hearing

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

§ Puncóchár, Judith M., Lecturer
Ph.D., University of Minnesota
Human relations, interpersonal and personality effects on learning

§ 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., Associate 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., Professor
Ph.D., Stanford University
Social and biological aspects of development

Karatekin, Canan, Assistant 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., 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, Jr., Herbert L., 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
Learning

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 and Leisure Studies, School of Kinesiology

§ Burton, Allen W., Professor
Ph.D., University of Oregon
Adapted physical education, motor development, movement skill assessment

Hancock, Peter A., Professor
Ph.D., University of Illinois
Human factors, study of time, motor behavior and performance

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, sports nutrition

Spletzer, Elizabeth, Education Specialist
M.S., Eastern Michigan University
Pedagogy, biomechanics

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

Faculty and Administration

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 sports

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
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

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

McCoy, Claire W., Associate Professor
Ph.D., University of Iowa
Music education, choral music, interdisciplinary and movement-based methods, measurement

Schultz, Stephen W., Associate Professor
Ph.D., Northwestern University
Music education, historical aspects, instrumental methods, computers in music

Work, Community, and Family Education

Brown, James M., Professor
Ph.D., Bowling Green State University
Special learning needs, diversity in education and work settings

Joerger, Richard, Assistant Professor
Ph.D., University of Minnesota
Agricultural, food, and environmental 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., The 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

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

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

§ Marjorie K. Cowmeadow, Associate 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

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

*** Amram, Fred M.B., Professor**
M.A., University of Minnesota
Speech communication, creativity

*** Brothen, Thomas F., Professor**
Ph.D., University of Minnesota
Psychology

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., Associate 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

Johnson, Fred A., Associate Professor
Ph.D., University of Minnesota, J.D., William Mitchell College of Law
Law in society, anthropology

Kahn, Peter T., Assistant Professor
J.D., University of Minnesota
Law, social studies

Kinney, Donald Patrick, Assistant Professor
Ph.D., University of Minnesota
Mathematics

*** 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., Assistant Professor
Ph.D., University of Massachusetts, Amherst
Writing

Moore, Randy, Professor
Ph.D., University California, Los Angeles
Biology, botany

Pedelty, Mark H., Assistant 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., Associate 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 Detzner, Associate Dean for Academic Affairs

Catherine Solheim, Associate Dean for Extension

Beth Emshoff, Director, Continuing Education and Professional Development

Katherine Maple, Director, Academic Student Services

Sara Nagel, Director, Career Services

John Sonnack, Director, Information Technology

Program Committee Chairpersons

Karen LaBat—Clothing Design

Barbara Martinson—Graphic Design

William Goodman—Family Social Science

Zata Vickers—Food Science

Ann Ziebarth—Housing Studies
Delores Ginthner—Interior Design
Mindy Kurzer—Nutrition
Joanne Eicher, Gloria Williams—Retail Merchandising

Faculty

■ Design, Housing, and Apparel

Angell, William J., Professor, Extension Specialist
 M.S., Iowa State University
 Indoor air quality and radon, building performance/durability

Boyd-Brent, James, Lecturer
 M.F.A., University of Minnesota
 Drawing, design materials, cultural variations in popular aesthetics

Bruin, Marilyn, Assistant Professor, Extension Specialist
 Ph.D., Iowa State University
 Affordable housing, household at-risk, housing policy, low-resource neighborhoods, residential satisfaction

Bye, Elizabeth, Lecturer
 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
 Housing and patterns of urban development, public policy and housing, landscape and urban places

DeLong, Marilyn R., Buckman Professor of Design Education
 Ph.D., The 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, Extension Specialist
 M.S., Iowa State University
 Protective clothing for special needs, textile/apparel business development

Ginthner, Delores A., Associate Professor, Director of Undergraduate Studies
 M.A., University of Minnesota
 Lighting design, environmental issues, life safety in design

*** Guerin, Denise A., Professor**
 Ph.D., Michigan State University
 Environmental/energy issues in design of interior environments

Hokanson, Brad, UC Coordinator
 M.Arch.U.D., Harvard University
 Computer interface design, speech synthesis, generated poetry, imaging

Johnson, Kim K. P., Professor, 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
 Artist's books, interactive multimedia, design history, professional graphic design practice, self-authorized design

Shen, Lindsay, Director, The Goldstein Museum of Design
 Ph.D., University of St. Andrews, Scotland
 Art history, furniture/decorative arts; regional/vernacular material culture

Waldron, Carol C., Education Specialist
 MA, University of Minnesota
 Typographic design for legibility and expression, visual books and material 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
 Mapping knowledge, ideologies appearance, women's labor, race, class, and gender, clothing practices and socialization

Yust, Becky Love, Associate Professor, Head
 Ph.D., The 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
Stephen 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

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., Adjunct Associate Professor, Coordinator
 Ph.D., Purdue University
 Undergraduate education, field study supervision, diversity issues

Grotevant, Harold D., Professor
 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, Head
 Ph.D., Michigan State University
 Decision making, financial issues, resource management, family ecology

Macy, Janet, Associate Professor
 M.S., Kansas State University
 Communication, use of media, cultural diversity

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

Ruerter, 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

Tubbs, Carolyn, Assistant Professor
 Ph.D., Purdue University
 Marriage and family therapy, black families, narrative research

Zuiker, Virginia S., Assistant Professor
 Ph.D., The Ohio State University
 Family resources, home-based employment, Hispanic family economics

Alcohol and Drug Counseling Education Program

Colgan, Philip, Adjunct Assistant Professor, Director
 Ph.D., University of Minnesota
 Chemical dependency, human sexuality, counselor education

Peter Dimock, Assistant Continuing Education Specialist
 M.S.W., University of Minnesota
 Alcohol and drug counseling, sexual abuse, men's sexuality

■ Food Science and Nutrition

Addis, Paul B., Professor
 Ph.D., Purdue University
 Lipid oxidation, fatty acids, atherosclerosis, food chemical toxicology

Asp, Elaine H., Associate Professor Emeritus
 Ph.D., University of Minnesota
 Physical/chemical characteristics of cereals, cereal-based products

Brady, Linda J., Professor
 Ph.D., Michigan State University
 Effects of diet on intestinal microflora and health

Busta, Frank F., Professor Emeritus
 Ph.D., University of Illinois, Urbana
 Factors affecting survival/growth of bacteria in food

Csallany, A. Saari, Professor
 D.Sc., University of Technical Science; Budapest, Hungary
 Lipid chemistry, nutritional biochemistry, free radicals, oxidative degradation

Darling, Mary E., Assistant Professor
 Ph.D., University of Minnesota
 Community nutrition, cross-cultural nutrition education, nutrition: elderly, economical

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., Associate Professor
 Ph.D., University of California, Davis
 Diet/colon cancer relationships, fat/fiber in diet

§Hanson, Madge N., Program Director
 M.S., University of Minnesota
 Medical nutrition therapy

Hassel, Craig A., Associate Professor
 Ph.D., University of Arizona
 Saturated fatty acids/dietary fiber on cholesterol metabolism

Hutchins, Andrea M., Assistant Clinical Specialist
 M.S., University of Minnesota
 Nutrition support, nutrition education, medical nutrition therapy, phytoestrogens

§Kurzer, Mindy S., Associate Professor
 Ph.D., University of California, Berkeley
 Dietary regulation of hormones, phytoestrogens, diet and cancer

*** Labuzu, 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

§Mullan, Jr., Louise M., R.D., L.D., Assistant Professor
 M.S., Iowa State University
 Acceptability and consumption of foods in institutional settings

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

Reicks, Marla M., Associate Professor
 Ph.D., Iowa State University
 Diet/cancer prevention, nutrition education for low income groups

Faculty and Administration

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

Schmidl, Mary K., Adjunct Professor
Ph.D., Cornell University
Food chemistry, biochemistry, human nutrition

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, Head
Ph.D., Oregon State University
Chemical reactions in food/food analysis, processing/storage

Willson, Karl S., Lecturer
M.S., Michigan State University
Food packaging, packaging technology

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

Ahluquist, Ann, Education Specialist
M.S.W., A.C.S.W., University of Minnesota
Child sexual abuse, violence prevention, child abuse prevention studies, child welfare

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, Assistant Professor
Ph.D., University of Southern California
Psychopathology, victim-offender mediation, cognitive-behavioral therapy, group therapy

Brandt, Diane, Education Specialist
M.S.W., University of Minnesota
Medical social work, older adults and aging, grief, loss, and bereavement

Burke, Kevin, Education Specialist
M.S.W., California State University, Sacramento
Field instruction, public health, socially marginal groups, chronic illness

Burnison, Mary K., Instructor
M.S.W., University of Minnesota
Adolescent female development, youth workers, experiential learning

Davila-Williams, Sonia, Coordinator
M.S.W., University of Pittsburgh
Child welfare, elder mistreatment, services for Chicano/Latino clients, field instruction

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

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

Sullivan, Maura, Program Director
M.S.W., University of Minnesota
Supervision/consultation in social work, peace and social justice, sexual harassment issues

Toft, Jessica, Education Specialist
M.S.W., University of Iowa
Child abuse prevention studies, child advocacy, social and community action

Umbreit, Mark, Professor
Ph.D., University of Minnesota
Mediation and conflict resolution, criminal justice, victim issues, violence prevention

Van Slyke, Victoria, Coordinator
M.S.W., University of Minnesota
Forensic practice, changing models of supervision, impact of trauma

Walters, Gail, Education Specialist
M.S.S.W., University of Louisville
Field instruction, disability issues, advocacy programs, medical social work

Wattenberg, Esther, Professor
M.A., University of Toronto, M.A., University of Chicago
Child welfare, welfare reform

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

Ann Waltner, Associate Dean for Academic Programs

Michael Hancher, Associate Dean for Faculty

Barbara Reid, Associate Dean for Planning and Initiatives

Suzanne Bardouche, Chief Financial Officer

Jean Cameron, Assistant Dean of Student Services

Gordon Hirsch, 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

Afro-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

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

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

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
U.S. ethnic and gender relations, anthropology, ritual

Yates, Gayle Graham, Professor
Ph.D., University of Minnesota
History, women's studies

■ 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
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

Lipset, David M., Associate Professor
Ph.D., University of California, San Diego
Social and political anthropology, history of anthropology; Melanesia

McCorriston, Joy, Assistant Professor
Ph.D., Yale University
Archaeobotany and environmental archaeology, neolithic societies, Mediterranean and Near East

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, Associate 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, ethnoarchaeology

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

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

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

Katsifacis, 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

§ **Lyon, Joyce, Associate Professor**
M.F.A., University of Minnesota
Drawing, painting

Morgan, Clarence, Professor
M.F.A., University of Pennsylvania
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

■ 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

■ Chinese

Allen, Joseph, Professor
Ph.D., University of Washington
Chinese literature and culture, Taiwan studies

Chen, Jue, Assistant Professor
Ph.D., Princeton University
Pre-modern Chinese fiction and drama

■ 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**

Brady, Nancy, Assistant Professor
Ph.D., University of Kansas
Preverbal communication, early intervention, beginning reading

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, Shirley, Clinical Specialist
M.A., University of Maryland
Speech and language disorders

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

Hunter, Lisa, Adjunct Associate Professor
Ph.D., University of Minnesota
Audiology

Javel, Eric, Adjunct Associate Professor
Ph.D., University of Pittsburgh
Bioacoustics

Kennedy, Mary, Assistant Professor
Ph.D., University of Washington
Neurological disorders of communication

Martin, Richard, Professor Emeritus
Ph.D., University of Minnesota
Stuttering, behavior modification

McDermott, Richard, Professor Emeritus
Ph.D., University of Iowa
Phonological disorders

Moller, Karlind, Adjunct Professor
Ph.D., University of Minnesota
Craniofacial anomalies

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

Solomon, Nancy, Assistant Professor
Ph.D., University of Arizona
Normal and disordered speech motor control

***§ Speaks, Charles, Professor**
Ph.D., University of Michigan
Speech perception

Stemberger, Joseph, Professor
Ph.D., University of California, San Diego
Psycholinguistics, phonetics, phonology, morphology

van Deusen, Diana, Associate Clinical Specialist
M.A., University of Iowa
Clinical audiology, aural rehabilitation

Viemeister, Neal, Adjunct Professor
Ph.D., Indiana University
Auditory perception, psychophysics

Windsor, Jennifer, Associate Professor
Ph.D., Purdue University
Language acquisition and disorders

■ **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, Assistant 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, Assistant Professor
Ph.D., City University of New York
Psychoanalysis and historiography, theories of the novel, technology, sexual difference

Mowitz, John, Associate Professor
Ph.D., University of Wisconsin
Critical theory, cultural technologies and popular practices

Pepper, Thomas, Assistant 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

Atkeson, Andrew, Associate Professor
Ph.D., Stanford University
Monetary theory, international trade

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

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

Geweke, John, Professor
Ph.D., University of Minnesota
Econometrics, macroeconomics, dynamic models, Bayesian inference in econometrics

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

Keane, Michael, Professor
Ph.D., Brown University
Labor economics, computationally intensive methods in econometrics

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

McLennan, Andrew, Associate Professor
Ph.D., Princeton University
Game theory, mathematical economics, microeconomics

Merlo, Antonio, Associate Professor
Ph.D., New York University
Public economics, applied econometrics, bargaining theory, political economy

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

Ohanian, Lee, Associate Professor
Ph.D., Rochester University
Macroeconomics, international economics, applied econometrics

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

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

Santos, Manuel, Professor
Ph.D., University of Chicago
Macroeconomics, growth, international economics

Schuh, G. Edward, Professor
Ph.D., University of Chicago
Economic development, agriculture and trade

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

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

***§ Anson, Christopher, Professor**
Ph.D., Indiana University
Theory and research of writing, writing across curriculum

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

Mowitz, 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
studies

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

Akehrst, 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, Maria, 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

Liu, Catherine, Assistant Professor
Ph.D., City University of New York
Classical Age literature and theater,
cultural studies

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
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

Faculty and Administration

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

Veregin, Howard, Associate Professor
Ph.D., University of California, Santa Barbara
GIS, remote sensing, digital cartography, spatial data quality

* **Weil, Connie, Associate Professor**
Ph.D., Columbia University
Medical geography, Latin America

German, Scandinavian, and Dutch

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

Hasselmo, Nils, Professor
Ph.D., Harvard University
Scandinavian linguistics

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

Lieberman, Anatoly, Professor
Dr. phil., University of Leningrad
General linguistics, Germanic philology, folklore, poetic translation

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, Assistant 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, Assistant 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

History

Allman, Jean, Associate Professor
Ph.D., Northwestern University
Modern Africa, modern West Africa, South Africa, women

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, Associate Professor
Ph.D., Rutgers University
Modern European history, British/Irish history, women's history, history of sexuality

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

* **Farmer, Edward, Professor**
Ph.D., Harvard University
Modern Chinese history, comparative early modern history,

Good, David F., Professor
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, 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

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

§ Lehmborg, 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

§ Munholland, Kim, Professor
Ph.D., Princeton University
Contemporary French social and political history, French imperialism

Noonan, Thomas, Professor
Ph.D., Indiana University, Bloomington
Medieval Russian history, archaeology, numismatics

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

Roediger, David, Professor
Ph.D., Northwestern University
Race and class in the United States

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

Skaria, Ajay, Assistant 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

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

Japanese**Kawashima, Terry, Assistant Professor**

Ph.D., Harvard University
Pre-modern Japanese literature, gender and sexuality

Pradt, Sarah, Associate Professor

Ph.D., Cornell University
Modern Japanese literature

Szatrowski, Polly, Associate Professor

Ph.D., Cornell University
Japanese language and linguistics

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

Ph.D., 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 Juilliard 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

Faculty and Administration

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

§ 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

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

Gray, Virginia, Professor
Ph.D., Washington University
American public policy, comparative state politics

Holt, Robert, Professor
Ph.D., Princeton University
Comparative political systems

Jacobs, Lawrence, Associate 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

Krislov, Samuel, Professor
Ph.D., Princeton University
Judicial behavior, American politics

Kvavik, Robert, Professor
Ph.D., Stanford University
Political organizations, Scandinavia

Lomonaco, Jeffrey, Assistant Professor
Ph.D., The Johns Hopkins University
Political theory

§ Nimtz, August, Professor
Ph.D., Indiana University
Africa, comparative and community politics

§ Price, Richard, Associate Professor
Ph.D., Cornell University
International relations

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, Professor
Ph.D., Columbia University
Comparative politics, Latin America

Silverstein, Gordon, Assistant Professor
Ph.D., Harvard University
Constitutional law, American politics

* **Smith, Steven, Distinguished McKnight University Professor**
Ph.D., University of Minnesota
Legislative and executive process

* **Sullivan, John, Regents 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

* **§ 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

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

Garnezy, 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

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 and 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

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

§ Peterson, Gail, Associate Professor
Ph.D., Indiana University
Learning and cognition, general behavior theory

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

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

Tsai, Jeanne, Assistant Professor
Ph.D., University of California, Berkeley
Cultural psychology, emotion, close relationships, minority mental health

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

Bian, Yanjie, Associate Professor
Ph.D., State University of New York, Albany
Stratification, research methods, social networks, China

Boyle, Elizabeth, Assistant 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

***§ Brusteine, William, Professor**
Ph.D., University of Washington
Political and historical sociology, stratification, social movements, comparative methods, social theory

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

Galaskiewicz, Joseph, Professor
Ph.D., University of Chicago
Organizations, community, social networks

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

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

Knocke, David, Professor
Ph.D., University of Michigan
Organizations and work, social networks, methods and statistics

Kruttchnitt, Candace, Professor
Ph.D., Yale University
Law and criminology and deviance, gender, life course

Laslett, Barbara, Professor
Ph.D., University of Chicago
Historical sociology, family, gender, sociology of knowledge, social theory

Leik, Robert, Professor
Ph.D., University of Wisconsin, Madison
Mathematical models, methods and statistics, family, social psychology, Nordic health care

Luffey, 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

Marini, Margaret, Professor
Ph.D., Johns Hopkins University
Stratification, gender, demography, social theory, quantitative methods, family, life course

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

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, Assistant Professor
Ph.D., University of Wisconsin
Crime and law and deviance, work, life course, methods and statistics

Ward, David, Professor
Ph.D., University of Illinois
Criminology, penology

■ *South Asian Languages*

§ Junghare, Indira, Professor
Ph.D., University of Texas
Marathi, Hindi, linguistics, culture and civilization of India

■ *Spanish and Portuguese Studies*

Arenas, Fernando, Assistant Professor
Ph.D., University of California, Berkeley
Luso-Afro-Brazilian studies, critical theory

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

Mirrer, Louise, Professor
Ph.D., Stanford University
Medieval literature, comparative literature, language development

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

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

Zahareas, Anthony, Professor
Ph.D., Ohio State University
History of Spanish literature: early to modern times

■ *Speech-Communication*

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

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

Faculty and Administration

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

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

Geisser, Seymour, Professor
Ph.D., University of North Carolina
Bayesian inference, model selection, predictivism, sample reuse, diagnostics

Geyer, Charles, Associate Professor
Ph.D., University of Washington
Markov chain Monte Carlo, constrained maximum likelihood, statistical genetics

Ghosal, Subhashis, Assistant Professor
Ph.D., Indian Statistical Institute, Calcutta
Asymptotics, Bayesian inference, nonparametrics

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

Louis, Thomas, Professor
Ph.D., Columbia University
Biostatistics, empirical Bayes, geostatistics, AIDS research

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

Pruitt, Ronald, Associate Professor
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Nonparametrics, survival analysis

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

Norwood, James, Associate Professor
Ph.D., University of California, Berkeley
Shakespeare, dramatic literature, humanities

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
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Modern dance, choreography

Underiner, Tamara, Assistant Professor
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Theatre history, Latin American and post-colonial theatre

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M.B.A., Illinois State University
Theatre management

Women's Studies

Desai, Jigna, Assistant Professor
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Postcolonialism, Asian-American, South Asian diaspora, globalization, transnational cultural studies

Geiger, Susan, Professor Emeritus
Ph.D., University of Dar es Salaam, Tanzania
African women's history, feminist theory, life history methodology

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, Assistant Professor
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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

David S. Kidwell, Dean

Christopher J. Nachtsheim, Associate Dean of Faculty and Research

Robert W. Ruekert, Associate Dean of Students and Academic Programs

Chris Mayr, Director of Development and Alumni Relations

Gary Lindblad, Assistant Dean of 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 of Undergraduate Programs

William T. Scheurer, Director of Executive Development Center

John Budd, Director of Graduate Studies, M.A. and Ph.D. Programs in Industrial Relations

Mahmood Zaidi, Co-Director of International Program Development

Michael Houston, Co-Director of International Program Development

Faculty

Accounting

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Information economics, game theory, decision theory

Antcil, Regina, Assistant Professor
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Biondich, Nick, Lecturer
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Caliendo, Charles, Lecturer
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Carter, Gary, Lecturer
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Dickhaut, John W., Honeywell Professor in Accounting
Ph.D., The Ohio State University
Economic and psychological determinants of accounting phenomena

Duke, Gordon L., Associate Professor
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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
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Behavioral decision-making

Kanodia, Chandra, Professor
Ph.D., Carnegie Mellon University
Auditor liability and audit pricing

Mukerji, Arijit, Associate Professor
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Economic theory, game theory, experimental economics

Radhakrishna, Balkrishna, Assistant Professor
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Market regulations, investor behavior, price discovery, information dissemination

Rayburn, Judy D., Professor
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Capital markets

Shapiro, Brian, Assistant Professor
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Shroff, Pervin, Assistant Professor
Ph.D., Columbia University

Spero, Andrew, Assistant Professor
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Tranter, Terry, Lecturer
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■ Department of Business Law

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■ Finance

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Investments, portfolio theory and management

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Initial public offerings of equity, commercial mortgage default

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Asset pricing, time series econometrics, empirical finance

Boyd, John H., Professor, Frederick R. Kappel Chair in Business and Government Relations
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Finance and development, financial intermediation, banking

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International economics, development economics, macroeconomics

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Economics of incentives and information, comparative economic institutions

Gibson, Scott, Assistant Professor
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Ioffe, Ioulia, Assistant Professor
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Derivatives, investment, term structure estimation, pricing by arbitrage, fixed income securities

Kidwell, David S., Professor
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U.S. and international banking, fixed income securities

Levine, Ross, Professor
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International finance, financial regulations and policies, economic development

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Corporate finance, corporate restructuring

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Asset pricing, incomplete markets, portfolio choice

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Financial contracting, corporate finance, corporate restructuring

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Financial management

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Corporate finance, auction theory, agency models and mergers and acquisitions, market microstructure

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Financial contracting, corporate finance

■ Health Care Management

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Executive education for health care administrators

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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

Johnson, George, Associate Professor
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Strategy, organizational structure and effectiveness, health care mergers

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Medical sociology, health politics and policy

Madden, Mary Jane, Assistant Professor
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Parente, Stephen, Assistant Professor
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Managed care, health information technology, health economics

Potthoff, Sandra, Assistant Professor
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Decision making in health care

Weckwerth, Vernon, Professor
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Variable effects on health service delivery

■ Industrial Relations

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Demographic economics, forecasting, labor economics

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Staffing, training, and development

Azevedo, Ross E., Associate Professor
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Compensation systems, human resource planning and skills inventories

Ben-Ner, Avner, Professor
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Theory of organization, employee ownership, nonprofit organizations

§ Bognanno, Mario F., Professor
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Labor economics and policy, collective bargaining

§ Budd, John, Associate Professor
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Collective bargaining and industrial relations, labor policy

§ Butler, Richard J., Professor, Williams/Minnesota Insurance Chair
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Workers' compensation, disability, health economics, discrimination

§ Fossum, John A., Professor
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Compensation

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§ McCall, Brian, Associate Professor
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Applied econometrics, econometric theory, economics of information

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Collective bargaining and industrial relations, labor arbitration

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International and comparative industrial relations

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Psychological experience of unemployment, job-seeking behavior

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Organization theory, theory of the firm, monetary economics

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Insurance law, coverage and claims, corporate risk management

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Labor market analysis, unemployment and industrialized countries

■ Information and Decision Sciences

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Problem-solving methodology

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Management of technology-based change

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Decision and judgment processes, belief processing

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MIS planning, information requirements determination

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Database management systems, logical data modeling

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Decision making, intelligent systems, knowledge work

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Information technology and financial services

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Database design, information systems development

Naumann, J. David, Associate Professor
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Information systems development, application prototyping, telecommunications

Park, Jinsoo, Assistant Professor
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Heterogeneous and distributed database management and integration

Prasad, Baba, Assistant Professor
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Economics and strategy in management information systems, analysis of IT practices in retail banking firms

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Knowledge management, electronic commerce, management of information systems

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Electronic commerce, the emerging information industry, applications of imaging and multimedia technologies

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Organizational impact of information technology, IT infrastructure management, adoption/usage of IT

■ Marketing and Logistics Management

Beier, Frederick J., Professor
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Interorganizational logistics systems and chain management

§ Bergen, Mark, Associate Professor
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Channels of distribution, pricing

Cardozo, Richard N., Professor, Carlson Chair in Entrepreneurial Studies
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Growth and development of new businesses

Chandy, Rajesh, Assistant Professor
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Marketing and technology

Childers, Terry L., Professor
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Visual information processing, measurement and psychometrics

Dong, Yan
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Supply chain management and optimization

Hansen, Robert A., Associate Professor
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Marketing research, strategic marketing planning

Houston, Michael J., Professor, Grieve Chair
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Consumer behavior and culture, international marketing

John, Deborah Roedder, Professor, Carlson Chair in Marketing
Ph.D., Northwestern University
Children's consumer behavior, consumer information processing

John, George, Professor
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Marketing channels, industrial marketing

Faculty and Administration

Meyers-Levy, Joan, Professor
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Consumer behavior

Loken, Barbara J., Professor
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Consumer behavior

Narasimhan, Om
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Channels

Rao, Akshay, Associate Professor
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Pricing

§ Roering, Kenneth J., Professor, Pillsbury/Gerot Chair in Marketing
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Marketing planning and corporate strategy

Ruekert, Robert W., Professor
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Marketing strategy, marketing organization and implementation

Walker, Orville C., Watkins Professor in Marketing
Ph.D., University of Wisconsin
Organizational issues in implementation of marketing structures

Operations and Management Science

Anderson, John C., Professor, Department Chair
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Quality management, operations strategy, operations analysis

Donohue, Karen, Assistant Professor
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Capacity planning, supply chain management, marketing/manufacturing interface

Hill, Arthur V., Professor
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Operations management, production and inventory management, international operations management

Li, William, Assistant Professor
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Experimental design, optimal design, robust design

Linderman, Kevin, Assistant Professor
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Statistical quality control, quality management, manufacturing planning and control systems

Meyer, Susan, Assistant Professor
Ph.D., The 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., Donaldson Professor of 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
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Stochastic processes and applied probability, Monte Carlo simulation methodology

Strategic Management and Organization

Albert, Stuart, Associate Professor
Ph.D., The 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

Bromiley, Philip, Professor, Carlson Chair in Strategic Management
Ph.D., Carnegie Mellon University
Risk-taking in organizations, strategic decision processes

Chakravarthy, Balaji S., Professor, Spencer Land Grant Chair in Technological Leadership
D.B.A., Harvard University
Strategic adaptation, management of technology

Cuervo, Alvaro, Assistant Professor
Ph.D., Massachusetts Institute of Technology
International competitiveness, firm and industry evolution, corporate governance, businesses in South America

Erickson, W. Bruce, Professor
Ph.D., Michigan State University
Antitrust economics, venture capital

Lenway, Stefanie, Professor
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International trade policy, international political economy

Maitland, Ian, Professor
Ph.D., Columbia University
Business ethics, ethics and markets

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

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

Schnatterly, Karen, Assistant Professor
Ph.D., University of Michigan
Internal and external governance, white collar crime

Shah, Priti P., Assistant Professor
Ph.D., Kellogg Graduate School, Northwestern University
Organizational behavior, social networks, group goal setting, negotiation

Srinivasan, Shaker, Associate Professor
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Corporate governance, mergers and acquisitions

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, Associate Professor
Ph.D., Massachusetts Institute of Technology
Competitive advantage for inter-firm relationships

Zaheer, Srilata, Associate 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., Allen-Pardee 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

McCullough, Jeffrey, Professor and Director, Division of Laboratory Medicine and Section of Transfusion Medicine
M.D., Ohio State University
Transfusion medicine

Solberg, Patricia, Teaching Specialist and Administrative Associate
B.A., Gustavus Adolphus College
Education, student recruitment and retention, clinical chemistry

Faculty

Brunzel, Nancy, Laboratory Manager
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Clinical chemistry, urinalysis, molecular biology

Erice, Alejo, Associate Professor
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AIDS/HIV pathogenesis, clinical virology

Gleason, William, Associate Professor
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Clinical chemistry, biomaterials, biomolecular recognition

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Clinical chemistry, molecular biology

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Clinical microbiology, parasitology, bacterial translocation

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Hemostasis, hematology

Tsai, Michael, Professor
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Biochemical/molecular genetics, cardiovascular disease, clinical chemistry

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Diagnostic microbiology and microbial pathogenesis

Teaching Specialists

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Clinical chemistry

Cook, Stella, Teaching Specialist
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Hematology

George, Joanna, Manager, Teaching Laboratories
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Immunohematology, microbiology, laboratory safety

Lorenz, Janet, Teaching Specialist
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Hematology

King, Lynn, Teaching Specialist
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Clinical chemistry

Yue, Mary Jane, Teaching Specialist
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Hematology

Mortuary Science

Faculty and Staff

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Mortuary law, embalming, restorative art

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Funeral management, history, embalming chemistry, computer science

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Funeral psychology and counseling, funeral management

LuBrant, Michael P., Instructor
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Embalming, restorative art, history, funeral psychology and counseling

College of Natural Resources

Administration

Alfred D. Sullivan, Ph.D., Dean

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James A. Perry, Ph.D., Head, Department of Fisheries and Wildlife

Joseph G. Massey, Ph.D., Head, Department of Wood and Paper Science

Alan R. Ek, Ph.D., Head, Department of Forest Resources

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Karen Lee Davis, Ph.D., Director, James Ford Bell Museum of Natural History

Faculty

■ Fisheries and Wildlife

- Adelman, Ira R., Professor**
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Fisheries management, physiology, aquaculture
- Andersen, David E., Associate Professor**
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Avian ecology and conservation
- Cohen, Yosef, Professor**
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Populations, mathematical ecology, ecosystem conservation
- Cooper, James A., Associate Professor**
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Waterfowl and wetland ecology
- Cuthbert, Francesca J., Professor**
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Conservation and biology of birds; endangered species conservation
- DelGiudice, Glenn D., Associate Professor**
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Nutritional and physiological ecology of large mammals
- Frenzel, L. Daniel, Professor Emeritus**
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Raptor ecology
- Fulton, David C., Assistant Professor**
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Human dimensions of biological conservation
- Garshelis, David, Associate Professor**
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Monitoring and managing large mammal populations
- Johnson, Mark R., Associate Professor**
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Wildlife handling and techniques for research and management
- Jordan, Peter A., Associate Professor**
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Ecology and management of mammalian herbivores
- Joshi, Anup, Research Associate**
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Asian mammal conservation
- Kapuscinski, Anne R., Professor**
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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**
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Wolf ecology and behavior
- Miller, Loren M., Research Associate**
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Fisheries conservation genetics
- Nelson, Kristen C., Assistant Professor**
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Human dimensions of natural resources, environmental management
- Newman, Raymond M., Associate Professor**
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Aquatic ecology and fisheries management
- Pereira, Donald L., Adjunct Assistant Professor**
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Population and community dynamics; ecosystem management

- Schoenfuss, Heiko L., Research Associate**
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Vertebrate morphology and behavior
- Simons, Andrew M., Assistant Professor**
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North American freshwater fish systematics
- Smith, James L.D., Associate Professor**
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Biology and conservation of Asian mammals
- Sorensen, Peter W., Professor**
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Fish behavior, physiology and chemoreception
- Spangler, George R., Professor**
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Population dynamics of fish, native American resource management
- Swain, Edward B., Adjunct Assistant Professor**
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Effects of air pollution on lakes, fish, and wildlife
- Vondracek, Bruce C., Associate Professor**
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Stream ecology and restoration
- Waters, Thomas F., Professor Emeritus**
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Stream ecology

■ Forest Resources

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Silviculture, reforestation
- Anderson, Dorothy H., Professor**
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Recreation resources management and policy analysis
- Ascerno, Mark E., Jr., Adjunct Faculty**
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Forest entomology: forest and urban plant pest control
- Bakuzis, Egolfs V., Professor Emeritus**
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Forest ecology, ecosystem foundations
- Bauer, Marvin E., Professor**
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Remote sensing of soils, crops and forests
- Baughman, Melvin J., Professor and Assistant Dean**
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Policy taxation economics and management
- Befort, William A., Adjunct Faculty**
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Remote sensing
- Bengston, David N., Adjunct Faculty**
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Economics, technical change, research planning, evaluation
- Berglund, Erwin R., Adjunct Faculty**
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Hydrology
- Blanchette, Robert A., Adjunct Faculty**
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Forest pathology: forest and shade tree diseases
- Blinn, Charles R., Professor**
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Management, economics, marketing, and harvesting
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Geographic information systems and forest ecology
- Brooks, Kenneth N., Professor**
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Forest hydrology, modeling impacts of land use on water resources
- Burk, Thomas E., Professor**
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Biometrics: forest growth modeling and experimental design
- Carey, Eileen V., Assistant Professor**
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Forest ecology, ecophysiology
- Carlson, Stephen P., Associate Professor**
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Youth development, park and recreation resources
- Cushing, Edward J., Adjunct Faculty**
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- Daley Laursen, Steven B., Associate Professor**
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Forest genetics
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Community/social forestry planning
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Resource survey design, modeling forest dynamics, research planning
- Ellefson, Paul V., Professor**
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- Erkkila, Dan L., Adjunct Faculty**
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Resource analysis
- Frelch, 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., Adjunct Faculty**
Ph.D., University of Minnesota
Forest and environmental policy
- 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**
Ph.D., University of Pittsburgh
Recreation resources management and tourism
- Lundgren, Allen L., Adjunct Faculty**
Ph.D., University of Minnesota
International forestry, economics
- 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 Jr., Lawrence C., 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
- Oleksyn, Jacek, Research Associate**
Ph.D., Silesian University, Poland
Ecophysiology, tree biology
- Ostry, Michael E., Adjunct Faculty**
Ph.D., University of Minnesota
Forest pathology
- § Perry, James A., Professor**
Ph.D., Idaho State University
Water quality, aquatic systems monitoring, watershed management
- 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
- Puettmann, Klaus J., Associate Professor**
Ph.D., Oregon State University
Silviculture and forest ecology
- Reich, Peter B., Professor and F.B. Hubachek, Sr. Chair in Forestry**
Ph.D., Cornell University
Forest ecology, ecophysiology

Faculty and Administration

Reichenbach, Mike, Adjunct Faculty
M.S., University of Illinois
Forest Economic Development Extension
educator, Cloquet Forestry Center

**Riemenschneider, Donald E., Adjunct
Faculty**
Ph.D., University of Minnesota
Genetics: tree improvement

Rose, Dietmar W., Professor
Ph.D., University of Wisconsin
Forest economics, planning models,
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

Schmidt, Thomas L., Adjunct Faculty
Ph.D., University of Nebraska, Lincoln
Multi-resource assessment

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

Tjoelker, Mark G., Research Associate
Ph.D., University of Minnesota
Tree physiology, ecophysiology, forest
ecology

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

Zasada, J.C., Adjunct Faculty
Ph.D., University of Michigan
Silviculture and regeneration ecology

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

**Gertjens, Roland O., Professor
Emeritus**
Ph.D., University of Minnesota
Fiber and particle products technology

Grimsrud, David T., Associate Professor
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 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

Mariah Snyder, Ph.D., Division Head I

Barbara Leonard, Ph.D., Division Head II

Ruth Lindquist, 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

Anglim, Mary Ann, Assistant Professor
M.Ed., University of Minnesota
Nursing role in tobacco cessation

Avery, Melissa, Associate Professor
Ph.D., University of Minnesota
Exercise as therapeutic intervention for
gestational diabetes

Bearinger, Linda, Associate Professor
Ph.D., University of Minnesota
Public health needs of adolescents

**Beniak, Judy, Instructor, Director,
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, Derry, Assistant Professor
Ph.D., University of Pennsylvania
Public health nursing

Bohn, Diane, Assistant Professor
Ph.D., 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, 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

Gerkenmeyer, Janis
Ph.D., Indiana University
Child psychiatric nursing

Giedt, Jane, Associate Professor
Ph.D., Wayne State University

Gross, Cynthia, Associate 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., Assistant
Professor**
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
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

**Krichbaum, Kathleen, Associate
Professor**
Ph.D., University of Minnesota
Quality of long-term care for
institutionalized elderly

**Leonard, Barbara, Associate Professor,
Division Head II**
Ph.D., University of Minnesota
Fetal alcohol syndrome, juvenile diabetes,
Indian health care

Lewis, Marsha, Associate Professor
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

Lindeke, Linda, Assistant Professor
Ph.D., University of Minnesota
Maternal child health issues, children with
chronic illness

**Lindquist, Ruth, Associate Professor,
Director of Graduate Studies**
Ph.D., University of Minnesota
Cardiovascular nursing, critical care
nursing, quality of life

**Miller, Marilee, Associate Professor,
Associate Dean**
Ph.D., University of Minnesota
Oncology nursing, technology-enhanced
learning

Mueller, Christine, Associate Professor
Ph.D., University of Maryland, Baltimore
Adult health, gerontology

**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 widowery, women's health,
depression and the family

Post-White, Janice, Associate Professor
Ph.D., University of Minnesota
Psychoneuroimmunology and cancer

Saewyc, Elizabeth
Ph.D., University of Washington
Adolescent and public health nursing

**Snyder, Mariah, Professor, Division
Head I**
Ph.D., University of Minnesota
Nursing interventions, identification and
determining efficacy

Struthers, Roxanne
Ph.D., University of Minnesota
American Indian health and health care

Urueta, Romana, Assistant Professor
M.S., University of California, Los Angeles
Pediatric nursing

Vellenga, Barbara A., Associate Professor
Ph.D., University of Texas, Austin

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

Zwygart-Stauffacher, Mary, Associate Professor
Ph.D., University of Wisconsin, Milwaukee
Oldest old women's health care issues and concerns

Education Specialists

Alaniz, Kären
Ph.D., University of Minnesota
Asthma self-management in children, chronic illness in children

Allard, Karen
M.S., University of Minnesota
Adult health, critical care

Bata-Jones, Bonnie
M.S., F.N.P., University of North Dakota, Grand Forks
Diabetes education

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

Friedrich, Cheri
M.S., University of Minnesota
Pediatrics

Hanninen, Linda
M.S., University of Minnesota
Maternal child health

Juve, Cathy
Ph.D., University of Minnesota
Substance abuse in pregnancy

Lent, Sandra
M.S., P.N.P., University of Minnesota
Infantile colic, otitis media, disease prevention

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

Rowan, Mary
Ph.D., University of Minnesota
Maternal-child health/childbearing families

Sabati, Navid
M.S.N., D' Youville College (New York)
Ridgeway, Sharon
Ph.D., University of Minnesota
Gerontology, Alzheimer's disease

Ringdahl, Deborah
M.S., University of Minnesota
Nurse midwifery

Saline, Elaine
M.P.H., University of Minnesota
Mental health and community

Smith, Kevin
M.S.N., F.N.P., University of Kentucky
Family nursing

Steffes, Mary
M.S., University of Minnesota
Adult health, critical care

Institute of Technology

Administration

H. Ted Davis, Dean

Steven Crouch, Associate Dean, Finance and Planning

Peter Hudleston, Associate Dean, Student Affairs

K.S.P. Kumar, Associate Dean, Academic Affairs

Karen Wolterstorff, Associate to the Dean

Anne Mockovak, Assistant to the Associate Dean

Richard Hatfield, Director, Development and External Affairs

Kristine Kosek, Director, Alumni Relations

Sharon B. Kurtt, Director, Career Services

Susan Ellis Marino, Director, Program for Women

Madonna Monette, Director, Finance

Frank Snowden, Director, Academic Program for Excellence in Engineering and Science

V. Rama Murthy, Director, Lower Division Programs, Mr. and Mrs. George W. Taylor Distinguished Teaching Professor

Robert Pepin, Director, Honors

Benjamin G. Sharpe, Director, Admissions

Paul Sorenson, Director, Communications

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

Enna, Dale F., Adjunct Associate Professor
Ph.D., Stanford University
Controls, dynamics, aeroelasticity, flight mechanics, dynamical systems

Eriksen, 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, Jr., Philip G., Professor Emeritus
Ph.D., Brown University
Plastic minimum principles, limit analysis and yield-line theory

Hslao, C.C., Professor Emeritus
Ph.D., Massachusetts Institute of Technology
Effect of molecular orientation, time on polymeric, composite systems

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
Ph.D., University of Minnesota
Vortex dynamics, turbulence, two-phase flows, tube transportation systems

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
Formation flying of satellites

Plunkett, Robert, Professor
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
M.S., University of Minnesota
Flight mechanics of aircraft and reentry vehicles, V/STOL, aerodynamics

Tezduyar, Tayfun E., Distinguished McKnight University Professor
Ph.D., California Institute of Technology
Computational applied fluid mechanics, computational aerospace engineering

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, Powerplant installation and Test Pilot). Aircraft and spacecraft design, flight testing, project management

Warner, William H., Professor
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

§ Gehr, 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

Woodward, Paul, Professor and Director of Laboratory for Computational Science and Engineering
Ph.D., University of California, Berkeley
Computational astrophysics, numerical techniques

■ 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, livestock environment

Faculty and Administration

Chaplin, Jonathan, P.E., Associate Professor

Ph.D., Iowa State University
Machinery design, safety, precision agriculture, computer-aided design

Clanton, Charles, P.E., Associate Professor

Ph.D., University of Minnesota
Waste management, agricultural structures, animal environment

Goodrich, Philip, P.E., Associate Professor

Ph.D., Purdue University
Odor control of animal waste, manure application

Jacobson, Larry, P.E., Associate Professor and Extension Engineer

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, Associate Professor

Ph.D., University of Illinois
Food engineering, value-added processing, MRI and NMR applications

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, injury prevention, human factors engineering

Subramanian, Anuradha, Assistant Professor

Ph.D., Virginia Polytechnic Institute and State University
Recombinant protein production in transgenic animal systems, downstream purification

Wilcke, William, P.E. (Iowa), Associate 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

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

Ph.D., University of Wisconsin
Nonequilibrium statistical mechanics, atomic collision theory

Daoutidis, Prodrimos, Associate Professor

Ph.D., University of Michigan
Nonlinear process control, process analysis and design

Davis, H.T., Regents Professor

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

Ph.D., University of Wisconsin
Biochemical engineering, microbial populations

Frisbie, C. Daniel, Assistant 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

Keller, Kenneth H., Professor

Ph.D., Johns Hopkins University
Transport in biological systems, biomedical engineering

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

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

Urry, Dan W., Professor

Ph.D., University of Utah
Bioelastic polypeptides, biomaterials

Varner, Jeffrey D., Assistant Professor

Ph.D., Purdue University
Mathematical modeling of cellular signaling and reaction networks

Ward, Michael D., Professor

Ph.D., Princeton University
Molecular materials, piezoelectric transducers

Weaver, John H., Professor

Ph.D., Iowa State University
Chemistry and physics of interfaces

Wentzcovitch, Renata M.M., Assistant 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 Professor

Ph.D., Rockefeller University
Organic and biological chemistry

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

Ph.D., University of Wisconsin
Physical chemistry

Davis, H. Ted, Professor

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, Assistant 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

Liu, Hung-Wen, Professor

Ph.D., Columbia University
Biological and organic 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
Ph.D., University of Wisconsin
Physical chemistry

Munson, Eric, Assistant Professor
Ph.D., Texas A&M University
Analytical, materials, and 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

***§ Pignolet, Louis, Professor**
Ph.D., Princeton University
Inorganic and materials chemistry

Que, Larry, Professor
Ph.D., University of Minnesota
Inorganic and biological chemistry

Rafferty, Michael, Professor
Ph.D., National University of Ireland
Biochemistry

Roberts, Jeffrey, Associate Professor
Ph.D., Harvard University
Physical, inorganic, and materials chemistry

Siepmann, J. Ilja, Assistant 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, Assistant Professor
Ph.D., University of Toronto
Inorganic, physical, 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, 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, hypodrop, 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

Levinson, David M., Assistant Professor
Ph.D., University of California, Berkeley
Transportation economics and financing, network deployment, integrated transportation and land use planning

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, micrometeorology, 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

§ Snyder, Mark B., Associate Professor
Ph.D., University of Illinois, Urbana-Champaign
Pavement design, analysis and rehabilitation, concrete materials/durability

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., Associate 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

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, Assistant 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

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

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

Faculty and Administration

Saad, Yousef, Professor
Doctorat, University of Grenoble, France
Sparse matrix computations, parallel computation, eigenvalue problems, nonlinear equations

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, distributed computing

Tripathi, Anand, Associate Professor
Ph.D., University of Texas at Austin
Distributed and network computing systems, object-oriented programming

Tsai, Wei-Tek, Professor
Ph.D., University of California, Berkeley
Software engineering, Internet/intranet computing and software systems.

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, Jr., E. Calvin, 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, limnology, geochemistry

Hirschmann, Marc M., Assistant Professor
Ph.D., University of Washington
Geochemistry and experimental petrology, igneous petrogenesis, mantle melting

Hooke, Roger LeB., Professor
Ph.D., California Institute of Technology
Geomorphology, glaciology, fluvial, glacial and subglacial processes

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

Karato, Shun-Ichiro, Professor
Ph.D., University of Tokyo
Mineral physics and geodynamics, energy transfer in terrestrial planets

Kelts, Kerry R., Professor
Ph.D., Swiss Federal Institute of Technology (ETH)
Limnology, geosphere/biosphere interactive systems

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, Jr., James D., Adjunct Faculty
Ph.D., University of Minnesota
Geologic mapping, petrology, metallogeny

Morey, G.B., Professor
Ph.D., University of Minnesota
Geologic mapping, stratigraphy, economic geology, Minnesota geology

Moskowitz, Bruce M., Associate 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

Person, Mark, Associate Professor
Ph.D., Johns Hopkins University
Computational hydrogeology, continental rift basin hydrodynamics

Pfannkuch, Hans-Olaf, Professor
DrIng, 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, Jr., William E., Professor
Ph.D., University of Southern California
Aqueous geochemistry, experimental and theoretical modeling of hydrothermal systems

Southwick, David L., Professor
Ph.D., Johns Hopkins University
Minnesota geology and hydrogeology, structural geology, metamorphic petrology, tectonics

Stout, James H., Professor
Ph.D., Harvard University
Petrology, geochemistry, materials science, igneous and metamorphic petrology

Teysier, 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., Assistant Professor
Ph.D., University of Washington
Metamorphic geology and tectonics, petrology and geochemistry of mountain belts

Wright, Jr., Herbert E., 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 semiconductor technology

§ 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., Physics, 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

Judy, Jack H., Professor
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., Associate Professor
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

Marculescu, Radu, Assistant Professor
Ph.D., University of Southern California, Los Angeles
CAD

- 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
- O'Keefe, Matthew T., Associate Professor**
Ph.D., Purdue University
Parallel processing with emphasis on parallel computer architectures
- 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**
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
- Ruden, P. Paul, Professor**
Ph.D., University of Stuttgart, FRG
Theory of novel semiconductor devices
- Sapatnekar, Sachin, Associate Professor**
Ph.D., University of Illinois at Urbana-Champaign
Computer aided design of VLSI systems
- Sapiro, Guillermo, Assistant 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
- 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
- Victoria, Randall, Associate Professor**
Ph.D., University of California, Berkeley
Magnetics
- Vinnakato, Bapiragu, Associate Professor**
Ph.D., Princeton University
Digital systems, testing, CAD for testing, fault tolerance correlations
- 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, Associate Professor**
Ph.D., University of Chicago
Dynamical systems, differential geometry
- Aeppli, Alfred, Professor Emeritus**
Ph.D., ETH, Zurich, Switzerland
Topology and geometry
- Agard, Stephen, Professor**
Ph.D., University of Michigan
Complex analysis
- Anderson, Greg, Professor**
Ph.D., Princeton University
Number theory
- Aronson, Donald, Professor**
Ph.D., Massachusetts Institute of Technology
Dynamical systems, differential equations
- Baxter, John R., Professor**
Ph.D., University of Toronto
Probability
- Bramson, Maury, Professor**
Ph.D., Cornell University
Probability
- Chow, Ben, Professor**
Ph.D., Princeton University
Geometric analysis, differential geometry
- Cockburn, Bernardo, Associate Professor**
Ph.D., University of Chicago
Numerical analysis
- Conn, Jack, Associate Professor**
Ph.D., Princeton University
Mathematical physics
- Eagon, John A., Professor**
Ph.D., University of Chicago
Commutative rings
- Edelman, Paul, Professor**
Ph.D., Massachusetts Institute of Technology
Combinatorics
- 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**
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, geometry
- Harper, Laurence R., Associate Professor**
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, Assistant Professor**
Ph.D., Ohio State University
Group representation theory
- Jodeit, Jr., Max A., Professor**
Ph.D., Rice University
Harmonic analysis
- Kahn, Donald, Professor**
Ph.D., Yale University
Topology
- Keynes, Harvey B., Professor**
Ph.D., Wesleyan University
Topological dynamics
- § Krylov, N.V., Professor**
D.Sc., Moscow State University
Probability and partial differential equations
- Kuske, Rachel, Assistant Professor, McKnight Land-Grant Professor**
Ph.D., Northwestern University
Applied mathematics
- Leung, Nai-Chung, Assistant Professor**
Ph.D., Massachusetts Institute of Technology
Geometric analysis
- Littman, Walter, Professor**
Ph.D., New York University
Partial differential equations
- Lowengrub, John, Professor, 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 analysis
- McCarthy, Charles, Professor**
Ph.D., Yale University
Functional analysis
- McGehee, Richard, Professor**
Ph.D., University of Wisconsin
Dynamical systems
- 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
Complex analysis
- Moeckel, Richard, Professor**
Ph.D., University of Wisconsin
Dynamical systems
- Neuhauser, Claudia, Associate Professor**
Ph.D., Cornell University
Probability
- Ni, Wei-Ming, Professor**
Ph.D., New York University
Partial differential equations
- Nitsche, Johannes, Professor**
Dr. Phil., University of Gottingen, 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
- Pour-El, Marian B., Professor**
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, Associate Professor, 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
- Sell, George R., Professor**
Ph.D., University of Michigan
Differential equations
- Sibuya, Yasutaka, Professor**
D.Sc., Tokyo University
Ordinary differential equations

Faculty and Administration

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, non-linear elasticity

Wang, Jiaping, Assistant 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

§ Bar-Cohen, Avram, Professor
Ph.D., Massachusetts Institute of Technology
Boiling/two-phase flow, electronic packaging, manufacturing process

§ 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., Associate 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

Erdal, Merve, Assistant Professor
Ph.D., University of Illinois at Chicago
Processing of high-performance materials, fluid mechanics, heat and mass transfer

***§ Erdman, Arthur G., Professor, P.E.**
Ph.D., Rensselaer Polytechnic Institute
Computer-aided design, kinematics, biomechanics, microelectromechanical systems

§ Fletcher, Edward A., Professor Emeritus
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- Greenlees, George W., Professor Emeritus**
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- *§ Jones, Roger S., Professor Emeritus**
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- Kubota, Yuichi, Associate Professor**
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- Mantis, Homer T., Professor Emeritus**
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- Marquit, Erwin, Professor Emeritus**
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- Peterson, Earl A., Professor**
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- § Poling, Ronald A., Professor**
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- Weyhmann, Walter, Professor**
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- Winckler, John R., Professor Emeritus**
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- Wygant, John, Assistant Professor**
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- Zimmermann, William, Jr., Professor**
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- Cook, R. Dennis, Professor**
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- Dickey, James M., Professor**
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The *italicized* number indicates faculty.

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