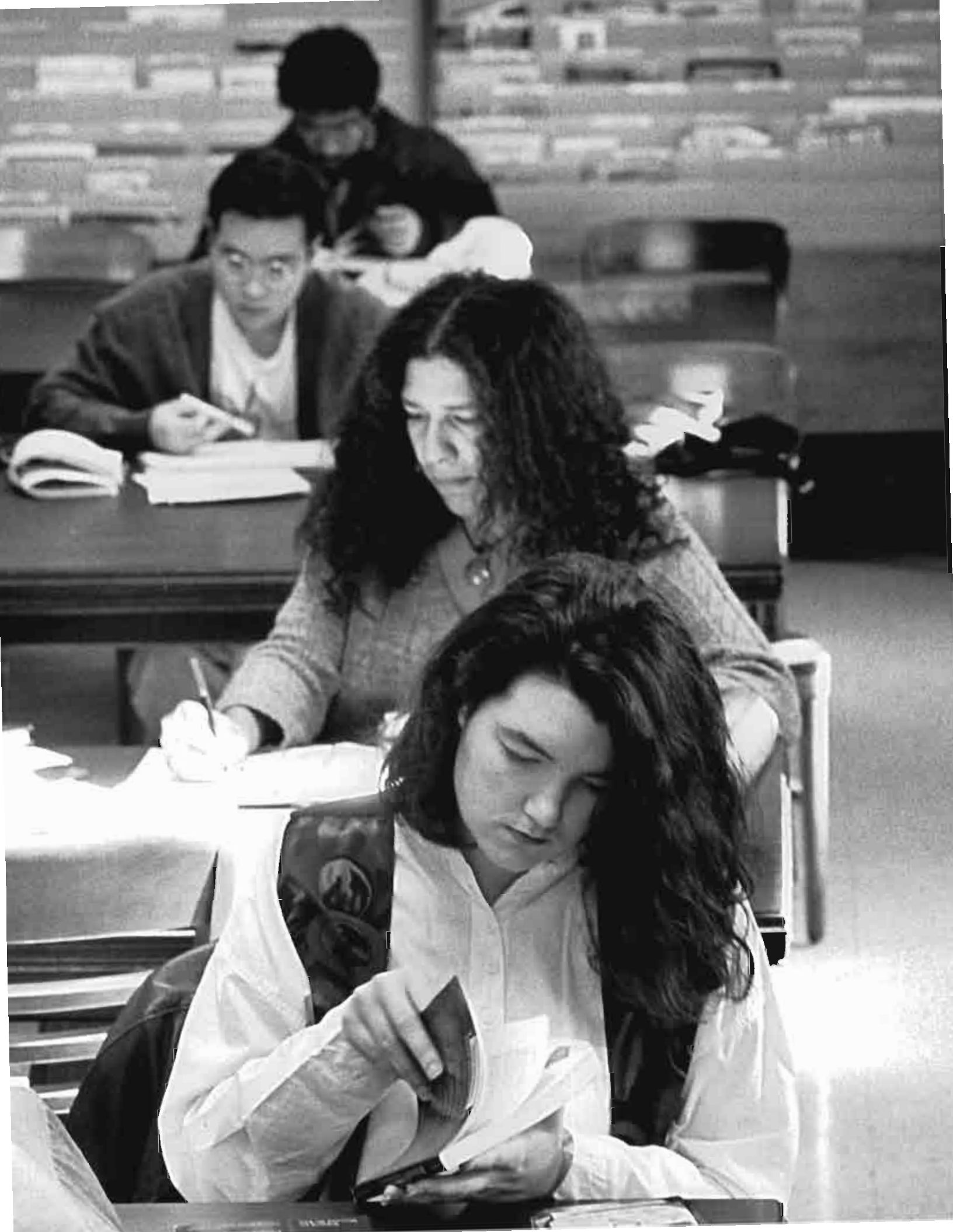


Undergraduate Catalog

This is the Introduction, General Information, and Policies sections of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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How to Use This Catalog

This is the University of Minnesota–Twin Cities *Undergraduate Catalog* for the academic year 1999-2000. This catalog is an academic planning tool for undergraduates. To learn how to use it, read this page.

This catalog describes bachelor's degree programs and their requirements, and it contains descriptions of courses that are offered, beginning fall 1999, to undergraduates.

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*. Both the *Class Schedule* and the *Course Guide* are available at University Bookstores during registration.

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.

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.

Course Descriptions

All undergraduate courses on the Twin Cities campus are listed in this section. See page 275 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.

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.

Note: Unless otherwise stated, the term "credits" refers to semester credits throughout the catalog.

Colleges and Programs

The college and program sections of this catalog provide detailed information about undergraduate degree programs and services offered by the following colleges and programs:

Agricultural, Food, and Environmental Sciences, College of

Architecture and Landscape Architecture, College of

Biological Sciences, College of

Dental Hygiene, Program in

Education and Human Development, College of General College

Human Ecology, College of

Liberal Arts, College of

Management, Curtis L. Carlson School of

Medical Technology, Program in

Mortuary Science, Program of

Natural Resources, College of

Nursing, School of

ROTC

Technology, Institute of

University College

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** on the following page or use the index at the back of this catalog.

Note: 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.

Alternative Formats

This publication is available in alternative formats on request. Contact the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008; e-mail admissions@tc.umn.edu).

A guide to course numbers, symbols, and abbreviations can be found on the inside back cover.

Directory of Undergraduate Programs

<i>Degree Program</i>	<i>College/School</i>	<i>Degree</i>	<i>Page</i>
Accounting	Management	B.S.B.	181
Actuarial Science	Management	B.S.B.	182
Aerospace Engineering	Technology	B.A.E.M.	241
Afro-American and African Studies	Liberal Arts	B.A.	129
Agricultural and Food Business Management	Agricultural, Food, and Environmental Sciences	B.S.	41
Agricultural Education	Agricultural, Food, and Environmental Sciences/ Education and Human Development	B.S.	43 93
Agricultural Industries and Marketing	Agricultural, Food, and Environmental Sciences	B.S.	46
American Indian Studies	Liberal Arts	B.A.	129
American Studies	Liberal Arts	B.A.	130
Ancient Near Eastern Studies	Liberal Arts	B.A.	130
Animal Production Systems	Agricultural, Food, and Environmental Sciences	B.S.	47
Animal Science	Agricultural, Food, and Environmental Sciences	Minor only	48
Anthropology	Liberal Arts	B.A.	130
Applied Business	University	B.A.B.	272
Applied Economics	Agricultural, Food, and Environmental Sciences	B.S.	48
Architecture	Liberal Arts	B.A.	131
Art	Liberal Arts	B.A., B.F.A.	133
Art History	Liberal Arts	B.A.	134
Astronomy	Liberal Arts	B.A.	134
Astrophysics	Technology	B.S.Astro.P.	242
Biblical Studies	Liberal Arts	Minor only	135
Biochemistry	Biological Sciences	B.S.	76
Biology	Liberal Arts	B.A.	135
	Biological Sciences	B.S.	77
Biosystems and Agricultural Engineering	Technology	B.B.A.E	243
Business and Industry Education	Education and Human Development	B.S.	96
Chemical Engineering	Technology	B.Ch.E.	245
Chemistry	Liberal Arts	B.A.	136
	Technology	B.S.Chem.	246
Chicano Studies	Liberal Arts	B.A.	136
Child Psychology	Liberal Arts	B.A., B.S.	137
Chinese	Liberal Arts	B.A.	138
Civil Engineering	Technology	B.C.E.	247
Classical Civilization	Liberal Arts	B.A.	138
Clothing Design	Human Ecology	B.S.	113
Coaching	Education and Human Development	Minor only	97
Computer Engineering	Technology	B.Comp.Eng.	248
Computer Science	Liberal Arts	B.A.	139
	Technology	B.S.Comp.Sc.	249
Construction Management	University	B.C.M.	272
Crops and Soils Resources Management	Agricultural, Food, and Environmental Sciences	B.S.	49
Cultural Studies and Comparative Literature	Liberal Arts	B.A.	139
Dance	Liberal Arts	B.A., B.F.A.	140
Dental Hygiene	Dentistry	B.S.	86
Dutch	Liberal Arts	Minor only	141
East Asian Studies	Liberal Arts	B.A.	141
Ecology, Evolution, and Behavior	Biological Sciences	B.S.	77
Economics	Liberal Arts	B.A., B.S., B.A.Quant.	141
Electrical Engineering	Technology	B.E.E.	250
Emergency Health Services	University	B.E.H.S.	273
English	Liberal Arts	B.A.	143
Environmental Design	Architecture and Landscape Architecture	B.E.D.	62
Environmental Horticulture	Agricultural, Food, and Environmental Sciences	B.S.	49
Environmental Science	Agricultural, Food, and Environmental Sciences	B.S.	50
European Area Studies	Liberal Arts	B.A.	144
Family Social Science	Human Ecology	B.S.	113
Film Studies	Liberal Arts	B.A.	144
Finance	Management	B.S.B.	182
Fisheries and Wildlife	Natural Resources	B.S.	204
Food Science	Agricultural, Food, and Environmental Sciences/Human Ecology	B.S.	51 114
Foreign Studies	Liberal Arts	Minor only	145
Forest Resources	Natural Resources	B.S.	206
Foundations of Education	Education and Human Development	B.S.	98
French	Liberal Arts	B.A.	145
French and Italian	Liberal Arts	B.A.	145
General Management	Management	B.S.B.	182
Genetics and Cell Biology	Biological Sciences	B.S.	78
Geography	Liberal Arts	B.A., B.S.	146
Geological Engineering	Technology	B.Geo.E.	252
Geology	Liberal Arts	B.A.	146
	Technology	B.S.Geol.	253
Geophysics	Technology	B.S.Geophys.	254
German	Liberal Arts	B.A.	147

**Nine former
University faculty
members have
received the Nobel
Prize. The faculty has
also included four
Pulitzer Prize winners
and several Grammy
Award winners.**

<i>Degree Program</i>	<i>College/School</i>	<i>Degree</i>	<i>Page</i>
Graphic Design	Human Ecology	B.S.	115
Greek	Liberal Arts	B.A.	148
Hebrew	Liberal Arts	B.A.	148
History	Liberal Arts	B.A.	149
History of Medicine	Liberal Arts	Minor only	149
History of Science and Technology	Liberal Arts	Minor only	150
Housing Studies	Human Ecology	B.S.	115
Human Resource Development	Education and Human Development	B.S.	98
Humanities in the West	Liberal Arts	Minor only	150
Individualized Studies	Liberal Arts	B.I.S.	150
Individually Designed Interdepartmental Major	Liberal Arts	B.A.	150
Information Networking	University	B.I.N.	274
Integrated Pest Management Cropping Systems	Agricultural, Food, and Environmental Sciences	Minor only	51
Interior Design	Human Ecology	B.S.	116
International Agriculture	Agricultural, Food, and Environmental Sciences	Minor only	52
International Business	Management	B.S.B.	182
International Relations	Liberal Arts	B.A.	151
Italian	Liberal Arts	B.A.	151
Japanese	Liberal Arts	B.A.	152
Jewish Studies	Liberal Arts	B.A.	152
Journalism and Mass Communication	Liberal Arts	B.A.	153
Kinesiology	Education and Human Development	B.S.	99
Latin	Liberal Arts	B.A.	154
Latin American Studies	Liberal Arts	B.A.	154
Linguistics	Liberal Arts	B.A.	155
Management Information Systems	Management	B.S.B.	182
Marketing	Management	B.S.B.	183
Materials Science and Engineering	Technology	B.Mat.S.E.	255
Mathematics	Liberal Arts	B.A.	156
	Technology	B.S.Math.	256
Mechanical Engineering	Technology	B.M.E.	257
Medical Technology	Medical	B.S.	191
Medieval Studies	Liberal Arts	Minor only	156
Microbiology	Liberal Arts	B.A.	156
	Biological Sciences	B.S.	79
Mortuary Science	Medical	B.S.	196
Music	Liberal Arts	B.A.	157
Music Education	Liberal Arts	B.M.	158
Music Therapy	Liberal Arts	B.M.	158
Music-Jazz Studies	Liberal Arts	B.M.	159
Music-Performance	Liberal Arts	B.M.	159
Natural Resources and Environmental Studies	Natural Resources	B.S.	208
Neuroscience	Biological Sciences	B.S.	79
Nursing	Nursing	B.S.N.	224
Nutrition	Agricultural, Food, and Environmental Sciences/Human Ecology	B.S.	52 117
Philosophy	Liberal Arts	B.A.	160
Physics	Liberal Arts	B.A.	160
	Technology	B.S.Phys.	259
Physiology	Liberal Arts	B.A.	161
Plant Biology	Biological Sciences	B.S.	80
Political Science	Liberal Arts	B.A.	161
Psychology	Liberal Arts	B.A.	162
Recreation, Park, and Leisure Studies	Education and Human Development	B.S.	99
Recreation Resource Management	Natural Resources	B.S.	213
Religious Studies	Liberal Arts	B.A.	162
Retail Merchandising	Human Ecology	B.S.	118
Risk Management and Insurance	Management	B.S.B.	183
Russian	Liberal Arts	B.A.	163
Russian Area Studies	Liberal Arts	B.A.	163
Scandinavian Languages and Finnish	Liberal Arts	B.A.	164
Science in Agriculture	Agricultural, Food, and Environmental Sciences	B.S.	53
Scientific and Technical Communication	Agricultural, Food, and Environmental Sciences	B.S.	55
Sociology	Liberal Arts	B.A., B.S.	165
Soil Science	Agricultural, Food, and Environmental Sciences	Minor only	56
South Asian and Mideast Area Studies	Liberal Arts	B.A.	166
Spanish	Liberal Arts	B.A.	166
Spanish-Portuguese	Liberal Arts	B.A.	167
Speech and Hearing Science	Liberal Arts	B.A.	168
Speech-Communication	Liberal Arts	B.A.	168
Sport Studies	Education and Human Development	B.S.	100
Statistics	Liberal Arts	B.A.	169
	Technology	B.S.Stat.	260
Sustainable Agriculture	Agricultural, Food, and Environmental Sciences	Minor only	56
Theatre Arts	Liberal Arts	B.A.	169
Urban Forestry	Natural Resources	B.S.	214
Urban Studies	Liberal Arts	B.A., B.S.	170
Women's Studies	Liberal Arts	B.A.	171
Wood and Paper Science	Natural Resources	B.S.	215

Academic Calendars 1999-2001

1999-2000

Fall Semester 1999 (70 class days)

September 6	Labor Day
September 7	Classes begin
November 25-26	Thanksgiving holiday
December 15	Last day of instruction
December 16	Study day
December 17-23	Final examinations

Spring Semester 2000 (74 class days)

January 17	Martin Luther King holiday
January 18	Classes begin
March 27-31	Spring break
May 5	Last day of instruction
May 6-7	Study days
May 8-13	Final examinations

Intersession 2000 (14 class days)

May 22	3-week intersession begins
May 29	Memorial Day holiday
June 9	3-week intersession ends

Summer Session 2000 (49 class days)

June 12	8-week summer term begins
July 4	Independence Day holiday
August 4	8-week summer term ends
August 18	Summer Session ends

2000-2001

Fall Semester 2000 (70 class days)

September 4	Labor Day
September 5	Classes begin
November 23-24	Thanksgiving holiday
December 13	Last day of instruction
December 14	Study day
December 14-21	Final examinations

Spring Semester 2001 (74 class days)

January 15	Martin Luther King holiday
January 16	Classes begin
March 26-30	Spring break
May 4	Last day of instruction
May 5-6	Study days
May 7-12	Final examinations

Intersession 2001 (14 class days)

May 21	3-week intersession begins
May 28	Memorial Day holiday
June 8	3-week intersession ends

Summer Session 2001 (49 class days)

June 11	8-week summer term begins
July 4	Independence Day holiday
August 3	8-week summer term ends
August 17	Summer Session ends

See the current *Class Schedule* for course offerings, class hours, locations, and instructors. For details about particular courses, consult the *Course Guide*. Both are available at University Bookstores.

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Student Services and Activities 22

Student Services Directory 23



General Information

General Information

Overview

The University of Minnesota, with its four campuses—Twin Cities, Duluth, Morris, and Crookston—is one of the most comprehensive and prestigious universities in the United States. It is both the state's 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 19 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. Top programs require outstanding faculty. Based upon the most recent survey of the National Research Council, the scholarly quality of the University's faculty ranks among the top 10 public institutions in the nation.

Important parts of the University can be found throughout the state: 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 agricultural experiment stations 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 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. For more information, call the Commission at (312) 263-0456 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.

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:

(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

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

University College

Student Support Services, 101 Wesbrook Hall, 625-3333

Inter-College Program, 107 Armory, 624-2004

Program for Individualized Learning, 107 Armory, 624-4020

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>.

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. 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 a University student. Access to personal computing resources and the Internet are becoming increasingly important for students in and out of the classroom. (See "Computing" in this section of the catalog.) Many helpful Web sites have been created to assist students and advisers. A good starting point is the "Computer & internet information" site at <onestop.umn.edu/Computer/>.

University students should become familiar with at least two basic computer tasks: First, they need to open a personal e-mail account to connect to the Student Access System and the Web. Incoming students are notified before orientation about how to begin this process. Second, they should learn to register for classes via computer using the University's Web registration site, check the accuracy of their registration on a printout, use the computer to make any necessary changes to their registration (within allowed deadlines), and check their grades once the term is over. Students learn this process at orientation.

For more information about computing at the University, contact Academic and Distributed Computing Services, (612) 626-4276 or <www.umn.edu/adcs>.

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

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

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

University College

Student Support Services, 101 Wesbrook Hall, 625-3333

Campus-wide Centers

University Counseling & Consulting Services

Career Development Center, 302 Eddy Hall, 624-8344

Career counseling appointments, 624-3323

St. Paul Office, 190 Coffey Hall, 624-3323

International Student & Scholar Services

190 Hubert H. Humphrey Center, 626-7100

Disability Services

Career Connections & Careers Online Projects, 250 Nicholson Hall, 626-8035

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

319 Walter Library, 626-1055 (106A University Technology Center, June 1999)

Chicano/Latino Learning Resource Center

315 Science Classroom Building, 625-6013

Disability Services

30 Nicholson Hall, 626-1333 (moving to the Gateway Building fall 1999)

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 four locations on campus with new and used textbooks and course packets, reference and research materials, computer technology, school supplies, and University clothing. In addition, the Bookstores offer other services, including a textbook buy-back program, visiting author readings and discussions, and graduation supplies (e.g., caps and gowns). 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.

(area code 612)

East Bank Store

Williamson Hall, 625-6000

West Bank Store

Blegen Hall, 625-3000

St. Paul Store

St. Paul Student Center, 624-9200

Health Sciences Store

Moos Tower, 625-8600

The East Bank Store in Williamson Hall (612/625-3854) offers brand name computer hardware, software, and peripherals at special educational savings for University students, staff, and faculty.

Libraries

Housed in five major facilities and 11 branch sites, the University Libraries system includes more than 5.4 million print volumes, 48,000 serial subscriptions, 5.3 million microforms, 2.9 million government documents, and 390,000 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>.

Each major branch of the University Libraries houses different subjects.

- **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; applied economics
- **Walter Library** (East Bank)—education/psychology, science and engineering
- **Wilson Library** (West Bank)—social sciences, literature, art

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

Access to personal computing resources and the Internet are becoming increasingly important for students to effectively use University resources and to complete class work. Students can use centrally provided computing labs across campus. These are equipped with commonly used software and Internet access. Or students can buy personal computers and software at considerable discounts through the University Bookstores Computer Store. For computing lab locations and hours, see the Academic and Distributed Computing Services Public Labs Web site <www.publabs.umn.edu/publab/text/hrs-all.htm>. For information on the microcomputer purchase discount program, see the Bookstores Computer Store Web site <www.computerstore.umn.edu>.

Students receive a free basic e-mail/Internet account and Internet Tool Kit to support their academic work; students can also upgrade their account to get personal space on a Web server. For details or to open an account, see the e-mail/Internet Accounts Web site <www.umn.edu/adcs/info/accounts.html> or visit any computer lab on campus.

(area code 612)

East Bank (non IT)

54 Eddy Hall Annex, 625-0314

121 Elliott Hall, 624-0866

14 Folwell Hall, 625-4896

26 Lind Hall, 626-0856

9 Walter Library, 626-1899

IT

3-170 Electrical Engineering/Computer Science, 624-8885

4-204 Electrical Engineering/Computer Science, 625-9081

308 Mechanical Engineering, 625-7559

130 Physics Building, 625-6820

St. Paul

B-50 Magrath Library, 624-3269

17 Classroom Office Building, 626-1252

135 Classroom Office Building, 624-9226

305 McNeal Hall, 624-5367

West Bank

455 Blegen Hall, 626-7778

50 Humphrey Center, 624-6526

Short courses, self-directed training packages, and help lines provide students with comprehensive computing support. For details, see the Training and Short Courses Web site <www.umn.edu/adcs/info/training.html>. For information on help-line services and hours, see the Help-Line Web site <www.umn.edu/adcs/info/helpline.html>.

Most of the new
Minnesota Library
Access Center will be
housed
underground in two
caverns carved out
of the river bluffs.
Each cavern is longer
than two football
fields.

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. Hundreds of volunteer opportunities are also available. Through OSLO's National Student Exchange Program, students can study at one of more than 130 public colleges and universities in the United States 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.

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 April for a July 1 start date and in late 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 course of study 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, 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, 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 typically 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 any degree program.

Scholarships and Other Financial Resources—

Through a new scholarship fund, the Global Campus annually awards over 35 scholarships (\$500-\$1,000) to students participating in Global Campus programs. Students may apply most regular financial aid to study abroad, and additional scholarships and travel grants are available. The Global Campus has also secured reduced fees for University students participating in a variety of options.

For More Information—Advisers, catalogs, brochures, and a computer for Web surfing are available in 102 Nicholson Hall. Or call (612) 626-9000 or visit the Global Campus web site <www.UMabroad.umn.edu>.

General Information

Admissions and Prospective Student Services

The University of Minnesota-Twin Cities is one of 21 universities in the nation ranked a "Best Buy," offering "remarkable educational opportunities at a relatively modest cost," according to the *Fisk Guide to Colleges, 1998*.

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) 625-0000 or 1-800-752-1000 (TTY 612/625-9051).

Admissions Office Hours

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

General Application and Admission Information

For detailed information about official undergraduate application deadlines and admission policies and procedures, 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 1) freshmen and transfers from colleges outside the University of Minnesota system, 2) transfers from other colleges inside the University system, 3) international students, and 4) 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, 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 encouraged to do

so as additional support for their application. International students applying for adult special (non-degree seeking) admission should use the international student application rather than the adult special 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, check with 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). Students in the Twin Cities area may contact the Office of Admissions for information about registering for the MELAB test. To register for the MELAB outside the Twin Cities area, contact the English Language Institute, 3020 North University Building, University of Michigan, Ann Arbor, MI 48109-1057 USA, (734) 764-2416.

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.

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 Education and Human Development*

Program in Medical Technology

Program of Mortuary Science

School of Nursing

College of Pharmacy*

University College

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 with *less than a full year* of college work (fewer than 39 quarter or 26 semester credits, including courses in progress) 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; ACT preferred);
- high school rank percentile (HSR);
- patterns of coursework and performance.

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

The requirements below apply to students entering the University during the 1999-2000 academic year.

Students entering the University in 2000 or after must complete three (instead of two) years of social studies, including one year each of geography and United States history and one year in the visual or performing arts, including instruction in the history and critical interpretation of the art form.

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;
- two years of a single second language; and
- two years of social studies, including U.S. history.

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 must make up any deficiencies by end of the first year of enrollment on the Twin Cities campus.

For information on
orientation to the
University, contact
New Student
Programs, 324
Coffman Union,
(612) 624-0666
(e-mail:
nspo@tc.umn.edu).

Admission to Honors Programs

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

Honors opportunities and benefits include:

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

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

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

Admission of Post-Secondary Enrollment Options (PSEO) Students

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

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

Admission With GED Examination

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

Transfer Admission

Definition

Students who have completed one or more years of study (39 quarter credits or 26 semester credits) at a regionally accredited collegiate institution or internationally recognized foreign college or university may be considered for transfer admission. Most colleges and programs require a 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.

Transfer students who graduated from high school in 1987 or later and have not earned a bachelor's degree or its 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 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.*

Applicants who have completed fewer than 26 semester credits (or 39 quarter credits) at the time of application must submit a high school transcript as part of the admission process.

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.

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

Note: *Formal application is necessary for adult special 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 Union 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.

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—As of fall 1999, the University is converting to the *semester system*—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. Liberal education and general education courses are routinely accepted (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 a four-year college program. 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: Only the last grade is counted if a transfer course is repeated.
- The minimum grade required for transfer is D. 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 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, 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 nontraditional experiences (AP, IB, military training, DANTEs) 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. Credit award policies for CLEP vary by college. For additional information, contact the appropriate college office.

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 school and then transfer to the University of Minnesota–Twin Cities have completed the lower division portion of the University's liberal education (CLE) requirements. MTC completion must be noted on the official transcript.

Students who earn an A.A. degree at a Minnesota community college or community and technical college are considered to have completed a major portion of the CLE requirements. An A.S. degree will be evaluated for the CLE requirements on a course-by-course basis.

General Information

Admissions and Prospective Student Services

Note: Practitioner-oriented degrees through University College (UC) do not follow the Minnesota Transfer Curriculum. For more information, call UC 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 transcripted credits will be evaluated for transfer. A written evaluation should tell students which courses transfer and which do not. How a student's courses specifically meet degree requirements may not be decided until she or he arrives for orientation or has chosen a major.

If students have questions about their evaluation, they should call the Office of Admissions and ask to speak with a credit evaluator. Ask why judgments were made about specific courses. Many concerns can be cleared up with an understanding of why decisions were made. Students can appeal of they are not satisfied. See "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: 1) Student fills out an appeals form. Supplemental information you provide to reviewers—a syllabus, course description, or reading list—can help. 2) Department or committee will review. 3) Student receives, in writing, the outcome of the appeal. 4) 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.

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 offers nationally ranked programs that cover a broad spectrum of concerns critical to personal and economic well-being—including agricultural business management and economics, science and technology, communications, nutrition, public resource development, and international commerce. Graduates are employed as managers, scientists, nutritionists, planners, communicators, and technical specialists in a complex industry that provides 20 percent of the country's gross national product.

Admission: Admits freshmen and transfers.

Architecture and Landscape Architecture

The College of Architecture and Landscape Architecture (CALA) offers 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: Students apply to the architecture major the semester they will complete 60 credits. Students are admitted to the major based on space availability and academic record. A minimum GPA of 2.50 is required overall and in all architecture courses taken. Students enrolled at the University may declare an environmental design major at any point in their academic career.

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 undergraduate work (including courses in calculus and chemistry) with a competitive GPA.

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 and chemistry must be completed within five years of entry into the program. Admission is competitive.

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. Freshman admission only; the college does not admit students who have completed more than 25 semester credits of college work.

General Information

Admissions and Prospective Student Services

Registration

Financial Aid

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 also need a minimum GPA of 2.50.

Liberal Arts

The College of Liberal Arts (CLA) enrolls nearly two-thirds of the first-year students on the Twin Cities campus. One of the largest liberal arts colleges in the United States, it offers over 60 different majors for its approximately 13,500 students. Several departments—including communication disorders, economics, geography, political science, and psychology—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 an additional year of a second language, for a total of three years. Admission to some programs requires a special application or audition. Minimum GPA for transfer or adult special admission: 2.50.

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, paper science and engineering, forest products marketing, forest products production management, residential building science and technology, 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 goals 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.

University College

University College (UC) offers courses and programs designed for adult, part-time, and nontraditional learners, including evening classes and distance education. Four practitioner-oriented undergraduate degree programs designed for the working adult, as well as over twenty certificate programs in liberal arts, business, engineering, and human services are available through UC. In addition, the Inter-College Program (ICP) and Program for Individualized Learning (PIL) are self-designed UC programs that serve highly motivated, creative, and self-directed students who seek independence and flexibility in structuring their degree programs.

Admission: All UC 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.

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.

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 course 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 provides a range of published information at the Financial Aid Information Center, 210 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 210 Fraser Hall, 130 West Bank Union Skyway, 130 Coffey Hall, Minnesota Bookstores, Coffman Memorial Union, 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 four times a year, 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

OSFA has two campus locations. A full-service Financial Aid Information Center is located in 210 Fraser Hall, 106 Pleasant Street S.E., Minneapolis campus. General office hours are 8 a.m. to 4 p.m., Monday-Friday. Financial aid counselors are available by telephone at (612) 624-1665 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.

Office of Scholarships and Financial Aid

University of Minnesota
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 and the Student Accounts Receivable System (STARS). STARS is used to manage the billing and payment of tuition and fees, on-campus housing, and certain other campus charges. For more information, contact Student Accounts Receivable, 20 Fraser Hall, (612) 625-8500.

General
Information

Student Services
and Activities

Student Services
Directory

The University of
Minnesota's College
Bowl team was
national champion
three times in the
1980s and has been
regional champion
five times in the
1990s.

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, 256 Coffman Memorial Union, (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*.

Housing & Residential Life—The University has eight residence halls on campus: six on the East Bank, one on the West Bank, and one on the St. Paul campus. An apartment facility available for upper division students is located on the East Bank. More than 4,600 students live in the residence halls on campus, and about 120 students live in the apartment facility. 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.

Intercollegiate Athletics—The men's program offers baseball, basketball, cross country, football, golf, gymnastics, hockey, swimming & diving, tennis, track & field, and wrestling. For information, call (612) 625-4838. The women's program offers basketball, cross country, golf, gymnastics, hockey, soccer, softball, swimming & diving, tennis, track & 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 must visit the office to complete a Student Employment application. Jobs also may be viewed on the Web <data.ohr.umn.edu/student>. Work-Study and other positions are also available. St. Paul positions are also posted in 130 Coffey Hall.

Recreational Sports—The University offers recreational sports programs and facilities to improve the quality of life for students, staff, and faculty. The Sport Club 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 Minneapolis campus has two student facilities, **Coffman Memorial Union** and the **West Bank Union**, which provide places to study, socialize, eat, read, or attend meetings. Students also can play table tennis or bowl; take in a film, concert, or art show; or attend a lecture or discussion. Call (612) 624-4636 for more information. **The St. Paul Student Center** (612/625-9794) sponsors more than 400 events annually in the arts, entertainment, and community/current affairs. It offers a full range of recreational options. A special feature is The Outdoor Store, which offers a variety of travel information, gear, books, and rental of camping and skiing equipment.



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 624-INFO
- St. Paul Student Center Union Station 625-9794

University of Minnesota Alumni Association

501 Coffman Memorial Union
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

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.

Residency and reciprocity

240 Williamson Hall 625-6330

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 625-8297

Women's Intercollegiate Athletics

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

Bookstores

Computer store

Williamson Hall 625-3854

East Bank store

Williamson Hall 625-6000

Health Sciences store

Moos Tower 625-8600

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

Internet Helpline 626-7676
Microcomputer Helpline 626-4276

- 152 Shepherd Labs
- 93 Blegen
- 58 Biological Sciences

Copying services

Copies on Campus

- East Bank, 44 Coffman Memorial Union 625-3971
- 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

Counseling and Other Student Services

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

319 Walter Library 626-1055
(106A University Technology Center, June 1999)

Career Development Center

302 Eddy Hall 624-8344

Chicano/Latino Learning Resource Center

315 Science Classroom Building 625-6013

Crisis Clinic

408/410 Boynton Health Service
625-8475

Disability Services

30 Nicholson (moving to the Gateway Building fall 1999)
626-1333
(voice or TDD)

Equal Opportunity Office

419 Morrill Hall 624-9547

Gay, Lesbian, Bisexual, Transgender Programs Office

340 Coffman Memorial Union 626-2324

International Student and Scholar Services

190 Hubert H. Humphrey Building 626-7100

Learning and Academic Skills Center

104 Eddy Hall 624-7546

Mental Health Clinic

N400 Boynton Health Service 624-1444

Minnesota Women's Center

212 Nicholson Hall 625-9837

Program Against Sexual Violence

24-Hour Crisis Line 626-1300

407 Boynton Health Service 626-2929

Student Dispute Resolution Center

321 Coffman Memorial Union 625-5900

Student/Parent HELP Center

180 Appleby Hall 625-5307

University College Student Support Services

101 Westbrook Hall 625-3333

University of Minnesota Alumni Association

501 Coffman Memorial Union 624-2323

University Counseling & Consulting Services

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

Employment

Student Employment

U of M Job Center

170 Donhowe Building
319 15th Avenue S.E.
625-2000

Graduate Assistant Office

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

Entertainment/Arts

Bell Museum

624-7083

Coffman Memorial Union program information

624-INFO

The Connection (metro area)

922-9000

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

627-4430

University Theatre

120 Rarig Center 625-4001

West Bank Union

130 West Bank Union Skyway
624-INFO

Financial Aid

Scholarships and Financial Aid, Office of

210 Fraser Hall 624-1665

130 Coffey Hall 624-3731

Student Loan Collections

140 Williamson Hall 625-8007

General Information

Student Services Directory

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.

Health and Public Services

Boynton Health Service

410 Church Street S.E. 625-8400

Boynton Health Service (information)

109 Coffey Hall 624-7700

Boynton Health Service Emergency

626-2700

Dental emergencies

625-4908

Dental School Clinic

Seventh floor, Moos Tower 625-2495

Pregnancy and sexually transmitted infections testing

410 Church Street S.E. 625-3222

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

Women's Health Clinic

Ground floor, Boynton Health Service 625-3222

Housing

Housing & Residential Life

Comstock Hall-East 624-2994

Residence halls

- Bailey (St. Paul) 624-0700
- Centennial 625-4452
- Comstock 624-1995
- Frontier 624-9999
- Middlebrook (West Bank) 625-0536
- Pioneer 624-2929
- Sanford 624-2526
- Territorial 625-0971
- Wilkins 624-0044

International Resources

China Center

130 Management/Economics 624-1002

Global Campus

102 Nicholson Hall 625-3379

International Studies and Programs

201 Coffey Hall 625-7753

International Student and Scholar Services

190 Hubert H. Humphrey Center 626-7100

International Study and Travel Center

48 Coffman Memorial Union 626-4782

Legal Service

University Student Legal Service

160 West Bank Union 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

121 Murphy Hall 625-7892

Law Library

Law Center 625-4300

St. Paul Campus (Magrath) Library

1984 Buford Avenue 624-2233

Science and Engineering Library

206 Walter Library 624-3366

Library Learning Resource Centers

- **Bio-Medical Library**
270 Diehl Hall 626-4045

- **Walter Library**

15 Walter Library 624-1584

University Archives

10 Walter Library 624-0562

Personal Services

Automated teller machines

- Blegen Hall basement
- Coffman Memorial Union basement and first floor
- St. Paul Student Center lower level
- Willey Hall upper concourse
- Williamson Hall lower concourse

Banking services

University of Minnesota Credit Union
50 Coffman Memorial Union 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.–2:30 p.m.*
- 107 Coffey Hall 625-8108
8:00 a.m.–2:30 p.m.*

* summer hours vary

Child care

- **Child Care Center, University**
East Bank 627-4014
- **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

- **Coffman Memorial Union**
Information Desk 624-4636
- **Skyway Service Center**
West Bank 624-6338
- **St. Paul Student Center Union**
Station 625-9794
- **Student Services Center**
130 Coffey Hall 625-9225

Notary service

240 Williamson Hall 625-2008

Postal Service

- 28 Coffman Memorial Union 625-0981
- Dinkytown, 1311 Fourth Street S.E.
378-2113
- Williamson Hall main concourse
(stamp machine)

Registration, Fee Payment, and Student Records

Fee payment, Bursar's Office

- 145 Williamson Hall, East Bank
625-7535
- 130 Skyway, West Bank
626-9110
- 101A Anderson Hall, West Bank
625-1383
- 107 Coffey Hall, St. Paul
625-8108

Fee statement duplicate

- 200 Fraser Hall 625-5333
- 130 Coffey Hall 624-3731

Registration Center

- 200 Fraser Hall 625-5333
- 130 Coffey Hall 624-3731

Paid fee verification

20 Fraser Hall 625-8500

Transcripts, records problems

Office of the Registrar

- 200 Fraser Hall 625-5333
- 130 Coffey Hall 624-3731

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 625-8297

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

Commuter (bus) cards

- 28 Coffman Memorial Union 625-0981
- University Bookstore, Williamson Hall
625-6000
- West Bank Union Skyway Service
Center 624-6338

Metro Transit buses 349-7000

Motorist Assistance Program 626-7275

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Policies

Policies

The University of Minnesota has many policies pertaining to academic work and student life on campus. Students are responsible for complying with these policies. The following is a guide to policies that are relevant to undergraduates; it is not a compilation of all policies or their word-for-word presentation. 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. Instructors must be notified 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 also requires the University to verify that students receiving federal 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).

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 at all levels 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*.

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 Management & Economics (612/624-6073). The code is published regularly and also available on the Web at <www.umn.edu/regents/polindex.html>. 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.

Students are responsible for complying with policies in this catalog and other policies of the University.

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 an 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 not be allowed to register.

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, Acting 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/4year.htm>.

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 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. This 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.

In addition, there are registration symbols that do not carry grade points or credit.

3. Instructors must clearly define for a class, at one of its earliest meetings, the performance necessary to earn each grade or symbol.
4. 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).

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.

5. 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).
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 for each student, both at the end of each grading period and cumulatively, a grade point average (GPA), the ratio of grade points earned divided by the number of credits earned with grades of A-F (including pluses and minuses). Both the periodic and cumulative GPA appear on each student's record.
8. When a student repeats a course, all grades for the course appear on the transcript, the course credits may not be counted more than once toward degree and program requirements, and only the last enrollment for the course counts in the student's GPA.
9. Students may petition the college scholastic committee or other appropriate body about this policy.
10. The following grades (with grade points as indicated) and symbols are used on transcripts.

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, the student was 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.

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

Graduation, Applying for—To graduate, students must submit an *Application for Degree* to the Office of the Registrar by specified deadlines. (Effective fall 1999, students must submit the application 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 the credits are a required part of the 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 must 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.

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, 321 Coffman Memorial Union (612/625-5900), for assistance.

Grievances by student employees or other employees of the University are handled through the Grievance Office, 658 Management & Economics (612/624-1030).

Matters arising from student misconduct or actions taken under the Student Conduct Code are the responsibility of Student Judicial Affairs, 662 Management & Economics (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.

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.

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.

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

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 new “other humanities” category includes all courses in the current categories of philosophy, visual or performing arts, and other humanities or arts.)

Historical Perspective - at least 3 credits. A course fulfilling the historical perspective requirement will also apply toward the social science core requirement or the humanities core requirement, but the course may not also fulfill a designated theme.

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: One course of at least 3 credits in each of the following:

- Environment
- Cultural diversity
- International perspectives
- Citizenship and public ethics

Guidelines for courses that fulfill multiple requirements:

A course in the physical and biological sciences core or mathematical thinking core may fulfill at most one core requirement and one designated theme.

A course in the social sciences core or the humanities core that does not carry the historical perspective designation may fulfill at most one core requirement and one designated theme. A course that fulfills the historical perspective requirement may not fulfill a designated theme.

A course that does not fulfill any core requirement may fulfill no more than two designated themes simultaneously.

Each semester, the *Class Schedule* will publish the requirements and list all courses that satisfy them. In addition, the *Class Schedule* will list which of these courses are offered that semester and which are tentatively scheduled for the subsequent terms during the academic year.

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 at any participating Minnesota college or university, they fulfill the University's Twin Cities campus liberal education requirements. However, students will still need to complete a portion of the writing requirements. College advising offices have information about these requirements. For more information on using transfer credits for the liberal education requirements, contact the Office of Admissions (612/625-2008).

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.

When a student takes a prerequisite course after successfully completing a course that required the prerequisite, credit for the prerequisite course will be granted. Colleges and departments, at their discretion, may also allow students to receive credit by examination for the prerequisite course.

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 will 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. They will not be allowed to register for subsequent terms unless their academic adviser and college office are satisfied that satisfactory academic progress is being made.

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. 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 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. Following one semester of nonregistration, students will be sent information regarding both inactive

status and the University's leave of absence policy. To regain *active* status before registering for another term, students on inactive status 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 admitted. 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**.

The University of Minnesota also has campuses in Crookston, Duluth, and Morris.

College of Agricultural, Food, and Environmental Sciences

This is the College of Agricultural, Food, and Environmental Sciences section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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College of
Agricultural, Food, and
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College of Agricultural, Food, and Environmental Sciences

COAFES

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 1997-98, more than 850 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, adult special 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 "C" or better;
- at least a "C" average in transfer coursework;
- demonstrated a solid foundation in math and science;
- completed at the high school level the following coursework:
 - four years of English
 - three years of science, including one year each of biological and physical science
 - two years of a single second language
 - two years of social studies, including U.S. history

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 "C" or better;
- 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.

Adult Special Students—The adult special category of admission in COAFES is primarily for (1) students who are pursuing coursework in COAFES departments, but who are not degree-seeking students, or (2) students who are preparing for application to graduate programs offered by COAFES departments, but who still have some prerequisites to satisfy. Admission may be processed at any time before the first day of class. The adult special category is also open to (3) staff members in COAFES departments taking courses through the Regents Scholarship Program and (4) COAFES graduates returning for coursework to improve their skills.

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

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*.

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 next page.

Agricultural and Food Business Management

- Business Management
- Financial Management
- Food Processing, Wholesaling, and Retailing
- Marketing and Sales Management

Agricultural Education

- Agricultural Development
- Agricultural Education
- Natural and Managed Environmental Systems

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
- Environmental Management
- Land and Water Resources

Food Science

Nutrition

- Coordinated Program in Dietetics
- Nutrition
- Nutrition Science

Science in Agriculture

- Animal Science
- Food Science
- Nutrition
- Plant Sciences
- Science in Agriculture/Doctor of Veterinary Medicine Joint Degree
- Soil Science

Scientific and Technical Communication

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.

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;
- earn a coefficient of completion of .75 or greater in all coursework.

Finding your way around the college

<i>Interests</i>	<i>COAFES majors</i>	<i>Occupations</i>	<i>Primary COA departments</i>
Animals	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	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	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 telecommunications, Training and development specialist	Rhetoric
Turfgrass	EH	Golf course superintendent, Grounds maintenance, Athletic facilities manager, Lawn service owner	Entomology; Horticultural Science; Plant Pathology; Soil, Water, and Climate
Veterinary medicine	ScAg	Veterinarian	Animal Science

Key to Majors

- AgBu Agricultural and Food Business Management
- AgEd Agricultural Education
- AIM Agricultural Industries and Marketing
- ApEc Applied Economics
- APS Animal Production Systems
- BAE Biosystems and Agricultural Engineering
- 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

The college's
nationally
recognized advising
program connects
students with world-
class faculty
immediately in their
freshman year.

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 handled 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 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.

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 page 39). 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.

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.

Student Center Board of Governors—The St. Paul Student Center Board of Governors, composed of students elected to represent the academic units on the St. Paul campus, formulates policies for operation of the student center and establishes its budget. Information about the St. Paul Student Center, its operation, and opportunities to serve on its various planning and programming committees, is available at the information desk on the first floor of the student center.

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.

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

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

Interim Dean of the College
Philip O. Larsen, 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 Science and Technology
Education (CEHD)
- Agricultural Leadership, Training, and
Development (CEHD)
- Natural and Managed Environmental
Education (CEHD)

Agronomy and Plant Genetics

Burle B. Gengenbach, interim 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
122 Peters Hall
1404 Gortner 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. Pflieger, 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

<rhetoric.agoff.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

Crop varieties
developed at the
University add
millions of dollars to
the state's economy.
Soybean and malting
barley varieties alone
generate \$55 million
in added farmer
income per year in
Minnesota.

College of Agricultural, Food, and Environmental Sciences Degree 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 agricultural and food business management curriculum emphasizes the use of concepts and methods from economics and business management in the identification, analysis, and solution of 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 agribusiness. Examples of employment areas include finance and banking, management, input marketing, commodity marketing, food marketing, sales, administration, public and industrial relations, production management, economic and statistical analysis, managerial accounting, 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
 - BA 1550
 - Math 1142 or 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

To complete the degree, students must complete at least 120 credits, including at least 69 credits in the major. Frequently, courses in the foundation requirements also apply toward completion of the liberal education requirements.

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 2022—General Botany (3 cr)
Biol 2012—General Zoology (4 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 (4 cr)
ApEc 1102—Principles of Macroeconomics (4 cr)
ApEc 3001—Applied Microeconomics: Consumers and Markets (3 cr)
ApEc 3002—Applied Microeconomics: Managerial Economics (3 cr)
ApEc 3006—Applied Macroeconomics: Government and the Economy (3 cr)
ApEc 3007—Applied Macroeconomics: Policy, Trade, and Development (3 cr)
ApEc 3401—Markets, Marketing and Prices (2 cr)
ApEc 4501—Agribusiness Finance (3 cr)
ApEc 4821—Agribusiness Management (5 cr)
6-8 credits in applied economics in an area of emphasis. An internship 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)
BA 1550—Business Statistics: Data Sources, Presentation, and Analysis (4 cr)
Mgmt 3001—Fundamentals of Management (2 cr)
Mktg 3000—Principles of Marketing (2 cr)
6-8 credits from the Carlson School of Management in an area of emphasis.

Note: Elective courses in applied economics and from the Carlson School of Management are to be used to meet area of emphasis requirements.

Areas of Emphasis

12 credits in one of the following areas of emphasis:

Business Management

Acct 3201—Intermediate Management Accounting (2 cr)
ApEc 3451—Food and Agricultural Sales (3 cr)
ApEc 5811—Cooperative Organizations (3 cr)
ApEc 4096—Professional Experience Program: Internship (1-3 cr)
BLaw 3058—The Law of Contracts and Agency (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 3411—Grain Marketing Economics (2 cr)
ApEc 3421—Livestock and Meat Marketing Economics (2 cr)
ApEc 3451—Food and Agricultural Sales (3 cr)
ApEc 4096—Professional Experience Program: Internship (1-3 cr)
ApEc 5401—Intermediate Market and Price Analysis (3 cr)
ApEc 5481—Futures and Options Markets (3 cr)
ApEc 5751—Agricultural Trade and Trade Policy: Issues and Analysis (3 cr)

Financial Management

Acct 3201—Intermediate Management Accounting (4 cr)
Acct 5160—Financial Statement Analysis (4 cr)
ApEc 4096—Professional Experience Program: Internship (1-3 cr)
ApEc 5481—Futures and Options Markets (3 cr)
ApEc 5811—Cooperative Organizations (3 cr)
Fina 4121—Financial Markets and Interest Rates (2 cr)
Fina 4122—Banking Institutions (2 cr)
Fina 4241—Corporate Financing Decisions (4 cr)
Fina 4322—Security Analysis (4 cr)
Fina 4641—International Finance and Risk Management (4 cr)
BLaw 3058—The Law of Contracts and Agency (4 cr)
Econ 4432—International Finance (3 cr)
Ins 5100—Corporate Risk Management (2 cr)



Food Processing, Wholesaling, and Retailing

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 5481—Futures and Options Markets (3 cr)
 ApEc 5751—Agricultural Trade and Trade Policy: Issues and Analysis (3 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 communications, law, or information systems may use this alternative to design an area of emphasis. A program of study under this emphasis must be approved by the adviser and the major coordinator. At least 6 of the 12 credits must be completed after receiving approval.

Applied Science

An additional 12 credits are required in applied science. 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.

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.

Agricultural Science and Technology Education Specialization

This undergraduate specialization is a collaborative partnership by College of Education and Human Development and the College of Agricultural, Food, and Environmental Sciences. It 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 maintain an overall GPA of 2.75 and complete the Praxis I: Preprofessional Skills Test (PPST).

Degree Requirements

To complete the degree, students must complete at least 128 credits, including required courses in the major. 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 student teaching experience.

Required Courses

Students must meet the University's liberal education requirements. In addition, students must meet the following requirements.

Prerequisites (44-46 cr)

Prerequisite courses may apply toward liberal education requirements—see adviser.

Communications (10 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 (3 cr)

Core Sciences (19-21 cr)

Chem 1011—General Principles of Chemistry (4 cr)
 BioC 1012—General Principles of Biochemistry (3 cr)
 Biol 1009—General Biology (4 cr)
 or Biol 1051—Introduction to Environmental Science (3 cr)
 MicB 2022—General Microbiology (2 cr)
 Phys 1001—The Physical World: Energy and Its Impact on the Environment (4 cr)
 or Phys 1101—Fundamental 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 (12 cr)

HSci 1814—Introduction to History of Science: Ancient Study (4 cr)
 HSci 1815—Introduction to History of Science: Modern Science (4 cr)
 Psy 1001—Introduction to 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 1103—Crops, Environment, and Society (4 cr)
 Agro/Hort 4401 Plant Genetics and Breeding (4 cr)
 Hort 1001—Plant Propagation (4 cr)
 Hort 1002—Home Horticulture (3 cr)
 Hort 1012—Woody Landscape Plants (4 cr)
 Hort 1013—Interior Floral and Foliage Design (3 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 3203—Environment, Global Food Production, and Citizens (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)

The agricultural sciences program is consistently ranked as one of the top five programs of its kind in the country.

Agricultural Mechanization (6 cr)

Select two of the following courses:

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

Food Science (3 cr)

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

Professional Education (40 cr)

Foundations (15 cr)

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

Agricultural Education (15 cr)

- AgEE 1001—Introduction to Agricultural Education (1 cr)
- AgEE 1002—Career Planning for Agricultural Professionals (1 cr)
- AgEE 2096—Professional Practicum: Early Experience (1 cr)
- AgEE 5111—Agricultural Education Methods of Teaching (4 cr)
- AgEE 5112—Agricultural Education Program Organization and Curriculum for Youth (4 cr)
- AgEE 5113—Agricultural Education Adult Program Development and Technology (3 cr)
- AgEE 5114—Agricultural Education Seminar (1 cr)

Work, Community, and Family Education (10 cr)

- WCFE 5301—Philosophy and Practice of Vocational Education (2 cr)
- WCFE 5697—Teaching Internships: School and Classroom Settings (2 cr)
- WCFE 5698—Teaching Internship (6 cr)

**B.S.
Agricultural Leadership, Training, and
Development Specialization**

The 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.

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.

Degree Requirements

To complete the degree, students must complete at least 124 credits, including required courses in the major. The degree requirements for this program require the completion of the courses and business experience. Students must maintain an overall GPA of 2.00.

Required Courses

Students must meet the University's liberal education requirements. In addition, students must meet the following requirements.

Prerequisites (35 cr)

Prerequisite courses may apply toward liberal education requirements—see adviser.

Communications (10 cr)

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

Mathematics (3 cr)

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

Physical and Biological Sciences (14 cr)

- Agro 1103—Crops, Environment and Society (4 cr)
or Biol 1009—General Biology (4 cr)
- BioC 1012—General Principles of Biochemistry I (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)

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 (3 cr)
- Agro 2501—Weed Biology and Systematics (2 cr)
- Agro 3005—Applied Crop Physiology and Development (2 cr)
- AnSc 3203—Environment, Global Food Production and Citizens (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 3203—Environment, Global Food Production and Citizens (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)

- AgEE 2051—Current Technical Competencies (3 cr)

Emphasis Area

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 credit)
- Agro 2105—Seed Technology (1 credit)
- Agro 2501—Weed Biology and Systematics (2 cr)
- Agro 3203—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 1152—Writing on Issues of Science and Technology (3 cr)
Rhet 3221—Theories of Human Communications (3 cr)
Rhet 3257—Scientific and Technical Presentations (3 cr)
Rhet 3266—Group Process, Team Building, Leadership (3 cr)
Rhet 3401—Accessing Information Through Electronic Media (3 cr)

Agricultural Leadership and Development (6 cr)

AgEE 4221—Rural Leadership Development (3 cr)
AgEE 5361—World Development Problems (3 cr)

Experiential Education (3 cr)

AgEE 3096—Experiential Learning: Production and Business (3 cr)

Agricultural Education and Extension (9 cr)

AgEE 1001—Introduction to Agricultural Education (1 cr)
AgEE 1002—Career Planning for Agricultural Professionals (1 cr)
AgEE 5111—Agricultural Education Methods of Teaching (4 cr)
AgEE 5311—History, Philosophy, and Systems of Agricultural Extension Systems (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)

B.S.

Natural and Managed Environmental Education Specialization

The 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 2.75 and complete the Praxis I: Preprofessional Skills Test (PPST).

Degree Requirements

To complete the degree, students must complete at least 128 credits, including required courses in the major. The specialization requires a broad study in agriculture focused on the natural and managed environmental education areas. Areas of study include 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 student teaching experience.

Required Courses

Students must meet the University's liberal education requirements. In addition, students must meet the following requirements.

Prerequisites (39-41 cr)

Prerequisite courses may apply toward liberal education requirements—see adviser.

Communications (9-10 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 (3 cr)

Mathematics (3 cr)

Math 1031—College Algebra and Probability (3 cr)

Physical and Biological Science (19-20 cr)

BioC 1012—General Principles of Biochemistry (3 cr)
Biol 1009—General Biology (4 cr)
or Biol 1051—Introduction to Environmental Science (3 cr)
Chem 1011—General Principles of Chemistry (4 cr)
MicB 2022—General Microbiology (2 cr)

Phys 1001—The Physical World: Energy and Its Impact on the Environment (4 cr)

or Phys 1101—Fundamental Physics I (4 cr)

ScAg 1501—Biotechnology, People, and the Environment (3 cr)

Social Science (8 cr)

Psy 1001—Introduction to Psychology (4 cr)
HSci 1814—Introduction to History of Science: Ancient Study (4 cr)
or HSCI 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 (3 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 (4 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 3203—Environment, Global Food Production, and Citizens (3 cr)

Agricultural Mechanization (6 cr)

Select 6 credits from the following:

AgEE 2051—Current Technical Competencies (3 cr)
AgEE/BIE 3112—Technical Drawing and Production Technologies (3 cr)
AgEE/BIE 3120—Communication, Energy, Power, and Machinery Technology (3 cr)

Food Science (3 cr)

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

Professional Education (40 cr)

Foundations (15 cr)

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

Agricultural Education (15 cr)

AgEE 1001—Introduction to Agricultural Education (1 cr)
AgEE 1002—Career Planning for Agricultural Professionals (1 cr)
AgEE 2096—Professional Practicum: Early Experience (1 cr)
AgEE 5111—Agricultural Education Methods of Teaching (4 cr)
AgEE 5112—Agricultural Education Program Organization and Curriculum for Youth (4 cr)

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

AgEE 5114—Agricultural Education Seminar (1 cr)

Work, Community, and Family Education (10 cr)

WCFE 5301—Philosophy and Practice (2 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 the manufacturers and distributors of farm production inputs (such as equipment, structures, animal feed, health products, seeds, fertilizers, and crop protection products); the 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 the 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 the ability to competently apply quantitative and qualitative skills to solve business problems.

All departments in COAFES contribute to and are represented by the Agricultural Industries and Marketing (AIM) major. The major provides a broad-based educational program reflecting the academic strengths of COAFES and the University at large. It also prepares students for a challenging career in agricultural industries. The scientific knowledge and technical skills necessary to become an effective agribusiness professional are provided through requirements in the basic and agricultural sciences and are strengthened by selection of one of five areas of emphasis: animal industries, horticultural industries, crops and soils industries, food industries, or individualized emphasis.

Admission Requirements—Admission to COAFES.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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.

Required Courses

Foundation Requirements

Quantitative Foundations

Math 1142—Short Calculus (3 cr)

or Math 1271 Calculus I (4 cr)

ApEc 1251—Principles of Accounting (3 cr)

Plus one of the following:

Stat 3011—Introduction to Statistical Analysis (4 cr)

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

AnSc 2211—Biometrics for Livestock (3 cr)

Science Foundations

Biol 1009—General Biology (4 cr)

or Agro 1101—Biology of Plant Food Systems (3 cr)

Chem 1011—General Principles of Chemistry (4 cr)

BioC 1012—General Principles of Biochemistry (3 cr)

Professional Requirements

Experiential

AgEE 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:

BIE 3061—Professional Sales Management (3 cr)

ApEc 3451—Food and Agricultural Sales (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 (3 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 (3 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

AnSc 1011—Domestic Animals and Society (3 cr)

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)

Soil 2125—Basic Soil Science (4 cr)

or FScN 1112—Principles of Nutrition (3 cr)

Emphasis Areas

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 3005—Applied Crop Physiology and Development (2 cr)

Biol 3002—Plant Biology: Function (2 cr)

Soil 3416—Plant Nutrients in the Environment (3 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 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

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

Biol 3002—Plant Biology: Function (2 cr)

Hort 1012—Woody Landscape Plants (3 cr)

or Hort 1011—Herbaceous Landscape Plants (3 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

FScN 1021—Introductory Microbiology (4 cr)

FScN 3102—Introduction to Food Science (3 cr)

ApEc 4451—Food Marketing Economics (3 cr)

Plus at least 3 credits from the following:

FScN 3615—Sociocultural Aspects of Food, Nutrition, and Health (3 cr)

FScN 1511—Food Animal Products for Consumers (3 cr)

FScN 4614—Community Nutrition (3 cr)

Individualized courses (14 cr min) are selected according to students' 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 course of study may also be pursued.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including 59 credits in the major. Frequently, courses in the foundation requirements also apply toward completion of liberal education requirements.

Required Courses

Foundation Requirements

ApEc 1101—Principles of Microeconomics (3 cr)

Biol 1009—General Biology (4 cr)

BioC 1012—General Principles of Biochemistry (3 cr)

Chem 1011—General Principles of Chemistry (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 (3 cr)

Math 1031—College Algebra and Probability (3 cr)

Professional Requirements

AgEE 1002—Principles of Career Planning in Agriculture (1 cr)

AgET 3213—Engineering Principles and Applications (3 cr)

Agro 1103—Plant and Crop Science (4 cr)

AnSc 1011—Domestic Animals and Society (3 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)

Soil 2125—Basic Soil Science (4 cr)

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

AnSc 3221—Animal Breeding (4 cr)

AnSc 4609—Livestock Systems Analysis (2 cr)

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

CAPS 3502—Animal Health and Disease (3 cr)

or VPB 3103—General Microbiology (4 cr)

Emphasis Areas

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 4403—Ruminant Nutrition (3 cr)

AnSc 4011—Dairy Cattle Breeding (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 5 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 4405—Poultry Nutrition (3 cr)

AnSc 4602—Poultry Production Systems Management (4 cr)

*Students interested in poultry study should inquire about courses available through the Midwest Poultry Consortium

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

For students who want to include animal science coursework to enhance or supplement their major program. Students have considerable flexibility in choosing courses to meet the minor 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. This curriculum emphasizes fundamental written and oral communication skills and a strong foundation in economic principles and their applications. Potential 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

To complete the degree, students must complete at least 120 credits, including 80 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.

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 (3 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)

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

ApEc 1251—Principles of Accounting (3 cr)

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

BA 1550—Business Statistics (4 cr)

ApEc 3001—Applied Microeconomics: Consumers and Markets (3 cr)

ApEc 3002—Applied Microeconomics: Managerial Economics (3 cr)

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

ApEc 3007—Applied Macroeconomics: Policy, Trade, and Development (3 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 4821, ApEc 3501, ApEc 5031, ApEc 5811, ApEc 5481
- Marketing: ApEc 3451, ApEc 3411, ApEc 3421, ApEc 5401, ApEc 5811, ApEc 5481, ApEc 4451
- Food Retailing: ApEc 4821, ApEc 4451, DHA 5241, DHA 5242, 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 5611, 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 considerable 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)

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

To complete the degree, students must complete at least 120 credits, including 66 credits in the major. Frequently, courses in the foundation requirements also apply toward completion of liberal education requirements.

Required Courses

Foundation Requirements

Communications

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

Biol 1009—General Biology (4 cr)
or Agro 1101—Biology of Plant Food Systems (3 cr)
Chem 1011—General Principles of Chemistry (4 cr)
BioC 1012—General Principles of Biochemistry (3 cr)
EEB 3001—Ecology and Society (3 cr)

Professional Requirements

AgEE 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 4305—Crop Harvest, Storage, Processing, Utilization (3 cr)
or FScN 5551—Grains: Introduction to Cereal Chemistry and Technology (2 cr)
Agro 4096—Professional Experience Program: Internship (3 cr)
Agro 4603—Field Crop Scouting and Problem Diagnosis (2 cr)

Agro 4401/Hort 4401—Plant Genetics and Breeding (4 cr)
Agro 4505—Integrated Weed Management (4 cr)
Agro 4660—Senior Capstone (2 cr)
Agro 4605—Crop Management Technologies (3 cr)
or Hort 5030—Sustainable Horticultural Food Production (4 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 3001—Insects and Insect Management (1 cr)
and Ent 4001—Field Crop Entomology (2 cr)

One of the following:

Agro 3203—Environment, Global Food Production, and the Citizen (3 cr)
AgET 5203—Environmental Impacts of Food Production (3 cr)
NRES 3021—Plant Resource Management and the Environment (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 3416—Plant Nutrients in the Environment (3 cr)
Soil 3221—Soil Conservation and the Land Use Management (3 cr)
or Soil 3612—Soil and Environmental Biology (3 cr)
Electives

Final Project

Agro 4096—Professional Experience Program.

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.



Environmental Horticulture

Environmental Science

Food Science

Integrated Pest Management in Cropping Systems

The program offers the following emphases: 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

To complete the degree, students must complete at least 120 credits, including 55 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.

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)

Biol 1009—General Biology (4 cr)

Biol 2022—General Botany (3 cr)

Math 1031—College Algebra and Probability (3)

or Math 1142—Short Calculus (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)

BioC 1012—General Principles of Biochemistry (3 cr)

Phys 1001—The Physical World: Energy and Its Impact on the Environment (4 cr)

ApEc 1101—Microeconomics (3 cr)

Professional Requirements (39 cr)

Hort 1001—Plant Propagation (4 cr)

Hort 1012—Woody Landscape Plants (3 cr)

Hort 1011—Herbaceous Landscape Plants (3 cr)

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

Soil 2125—Basic Soil Science (4 cr)

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

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

Ent 3001—Insects and Insect Management (1 cr)

GC 1513—Principles of Small Business Management (3 cr)

Hort 3002—Greenhouse Management (3 cr)

Hort 4401—Plant Genetics and Breeding (4 cr)

PIPa 4000—Plant Pathology Practicum (choose 2-1 cr modules) (2 cr)

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

Hort 4096—Professional Experience Program (3 cr)

One additional business course chosen in consultation with adviser.

Emphasis Areas

Landscape Design, Implementation, and Management (21 cr min)

ApEc 1251—Principles of Accounting (3 cr)

Hort 4021—Landscape Design, Implementation, and Management I (4 cr)

Hort 4061—Turf and Landscape Management (4 cr)

Hort 5021—Landscape Design II (4 cr)

Hort 5024—Landscape Development (1 cr)

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

Nursery Production and Garden Center Management (21 cr min)

ApEc 1251—Principles of Accounting (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)

ApEc 3821—Retail Center Management (3 cr)

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

Greenhouse Production and Retail Floriculture (21 cr min)

ApEc 1251—Principles of Accounting (3 cr)

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

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

ApEc 3820—Retail Center Management (3 cr)

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

Turfgrass Management (21 cr min)

Hort 4061—Turf and Landscape Management (4 cr)

Hort 5061—Turfgrass Science (3 cr)

Hort 4021—Landscape Design, Implementation, and Management I (4 cr)

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

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

Individualized Program of Study (21 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)

Hort 3005—Environmental Effects on Horticultural Crops (2)

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.

The environmental science curriculum 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 will become knowledgeable about the 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.

Emphasis areas 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

To complete the degree, students must complete at least 120 credits, including 54 credits in the major. The program requires courses in calculus, chemistry, physics, biology, and geology. Applied science courses are in meteorology, soil science, hydrology, and plant science. Emphasis area courses vary by area.

Required Courses

Foundation Requirements

ApEc 1101—Principles of Microeconomics (3 cr)

ApEc 1102—Principles of Macroeconomics (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)

BioC 1012—General Principles Biochemistry (3 cr)

or Chem 2301—Organic Chemistry I (3 cr)

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

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)
 Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
 Agro 4101—Experimental Design/Plot Techniques (3 cr)
or Stat 3011—Introduction to Statistical Analysis (4 cr)
 Rhett 1152—Writing on Issues of Science and Technology (3 cr)
 Rhett 1223—Oral Presentations in Professional Settings (3 cr)
 Rhett 3562—Technical and Professional Writing (3 cr)

Professional Requirements

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)
 NRES 3061—Water Quality Management (3 cr)
or FR 4114—Hydrology (3 cr)
 Geo 1001—Introduction to Geology (4 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:

NRES 3021—Plant Resource Management and the Environment (3 cr)
 Agro 1101—Biology of Plant Food Systems (4 cr)
 Agro 1103—Crops, Environment, and Society (3 cr)
 Area of emphasis (15 cr)

Final Project

Internship requirement: students must complete ES 4096.

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

To complete the degree, students must complete at least 120 credits, including 82 credits in the major. Students must also complete the University's liberal education requirements and maintain an overall GPA of at least 2.00.

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)
 Rhett 1101—Writing to Inform, Convince, and Persuade (4 cr)
 Rhett 1223—Oral Presentations in Professional Settings (3 cr)
 Rhett 3562—Technical and Professional Writing (3 cr)
 Stat 3011—Introduction to Statistical Analysis (4 cr)

Pick one of the following lab courses: BioC 4025, Chem 2111, Chem 2311, FScN 4612

Pick one of the following microbiology courses: MicB 2032, MicB 3301, VPB 2032

Pick 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—Principles of Food Engineering (4 cr)
 FScN 4332—Food Processing Operations (3 cr)
 One of the following courses with a Capstone component: FScN 4341, FScN 4342, FScN 4343, FScN 4344

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 how to select and apply efficient and 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

Ent 5211—Insect Pest Management (3 cr)
 PIPa 5204—Epidemiology and Plant Disease Resistance (4 cr)
 Agro 2501—Weed Biology Systematics (2 cr)
 Agro 4505—Integrated Weed Management (4 cr)

Choose one of the following management courses:

Agro 4605—Management Technologies for Crop Production (3 cr)
 Hort 5031—Sustainable Fruit and Vegetable Production (4 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)
 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. The program gives students and advisers a high degree of flexibility in planning the minor. To complete the minor, students must complete at least 20 credits.

Required Courses

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

Nutrition

B.S.

The nutrition 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.

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

To complete the degree, 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.

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 4612—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 (3 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, 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 (2 cr)
FScN 4596—Field Experience in 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 (4 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 mathematics 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

To complete the degree, students must complete at least 120 credits, including required credits in the major. Faculty academic advisers help students select electives courses, 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 in the Policies section of this catalog. Frequently, courses in the foundation requirements also apply toward completion of liberal education requirements.

Required Courses

Foundation Requirements

Rhet 1101—Writing to Inform, Convince, and Persuade (4 cr)
Rhet 1152—Writing on Issues of Science and Technology (3 cr)
Rhet 1223—Oral Presentation (3 cr)
Math 1142—Short Calculus (3 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)
or AnSc 2211—Biometrics for Livestock (3 cr)
or Agro 4104—Experiment Design/Plot Techniques (3 cr)
Chem 1021—Chemical Principles I (4 cr)
Chem 1022—Chemical Principles II (4 cr)



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

Chem 2301—Organic Chemistry I (3 cr)
Chem 2302—Organic Chemistry II (3 cr)
Chem 2311—Organic Chemistry Lab (3 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)
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)
MicB 2105—Microbiology (4 cr)
or VPB 2105—Microbiology (4 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)

Emphasis Areas

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. Check with your adviser, the Department of Animal Science, or COAFES.

Biotechnology (22-25 cr)

ScAg 1502—Biotechnology Laboratory (2 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)

One of the following:

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

One of the following:

PBio 5414—Plant Cell and Molecular Biology (3 cr)
Soil 4601—Soils and Pollution (3 cr)
FScN 4121—Food Microbiology and Fermentation (3 cr)
AnSc 2301—Systemic Physiology (4 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 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)
PIPa 2001—Introductory Plant Pathology for Horticulturalists (3 cr)
or PIPa 2002—Diseases of Field Crops (3 cr)
Biol 2022—General Botany (3 cr)
Agro 2501—Weed Biology and Systematics (2 cr)
Soil 2125—Basic Soil Science (4 cr)
Ent 3001—Insects and Insect Management (1 cr)
Ent 3005—Insect Biology (concurrent with Ent 3001) (2 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 emphasis different from the above options 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 will 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 this program must meet CVM application standards; admission is competitive. COAFES students applying under the agreement will 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 will constitute the fourth year of the science in agriculture/D.V.M. joint program and will lead 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.

Admission Requirements—Students planning to major in scientific and technical communication enter COAFES with a pre-major status. After completing the prerequisite courses, students apply for full major status. To apply, students must complete 27 prerequisite credits (see below) and submit the application materials to the Admissions Committee. Application materials include an application form; college transcripts; letter of intent; portfolio that includes 3-5 writing samples, 1-2 other samples, and a profile letter; and the Pre-Major Checklist that shows a 2.50 GPA in the following:

- 3 credits in Rhet 3221—Theories of Human Communication)
- 6 additional credits in rhetoric, English, or composition
- 6 credits in lab-based physical or biological science
- 6 credits in math, computer science, engineering, or technology
- 6 credits in social sciences, history, or humanities

Although a 2.00 GPA is required to be admitted to COAFES, a 2.50 GPA in the 27 prerequisite credits is required to be admitted to the scientific and technical communication major.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including 81 credits in the major. Students must also complete the University's liberal education requirements.

Required Courses

Equivalent transfer courses are accepted in all areas (except for specific required rhetoric courses as indicated). 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 (27 cr)

A-1. Written Communication (12 cr)

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

Rhet 3562—Technical and Professional Writing (3 cr)

Rhet 4561—Editing and Style for Technical Communicators (3 cr)

Rhet 5662—Advanced Technical Communication (3 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 (21 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 (9 cr)

Rhet 3221—Theories of Human Communication (3 cr)

Rhet 3701—Rhetorical Theory and Scientific and Technical Communication (3 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 (9 cr)

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

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

Rhet 5108—Gender in Rhetoric of Science and Technology (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. The 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 specific required rhetoric courses as indicated in the listed under Required Courses). The program also expects students 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).

Minor Requirements

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 compliment students' career plans. For help in planning a minor, contact the major coordinator of the Scientific and Technical Communication program in the Department of Rhetoric. Students must complete at least 21 credits to complete the minor.

Prerequisite Courses

Rhet 1101 (or 1151), 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 (3 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

Allows students to complete the coursework required for the Professional Soil Science Examination for geoscientists. Students need to complete at least 20 credits to complete the minor.

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 5515—Soil Genesis and Landscape Relations (3 cr)
Soil 5555—Wetland Soils (3 cr)
Soil 5711—Forest Soils (2 cr)

Sustainable Agriculture

Minor Only

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 elective options. Students should develop their courses of study 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.

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

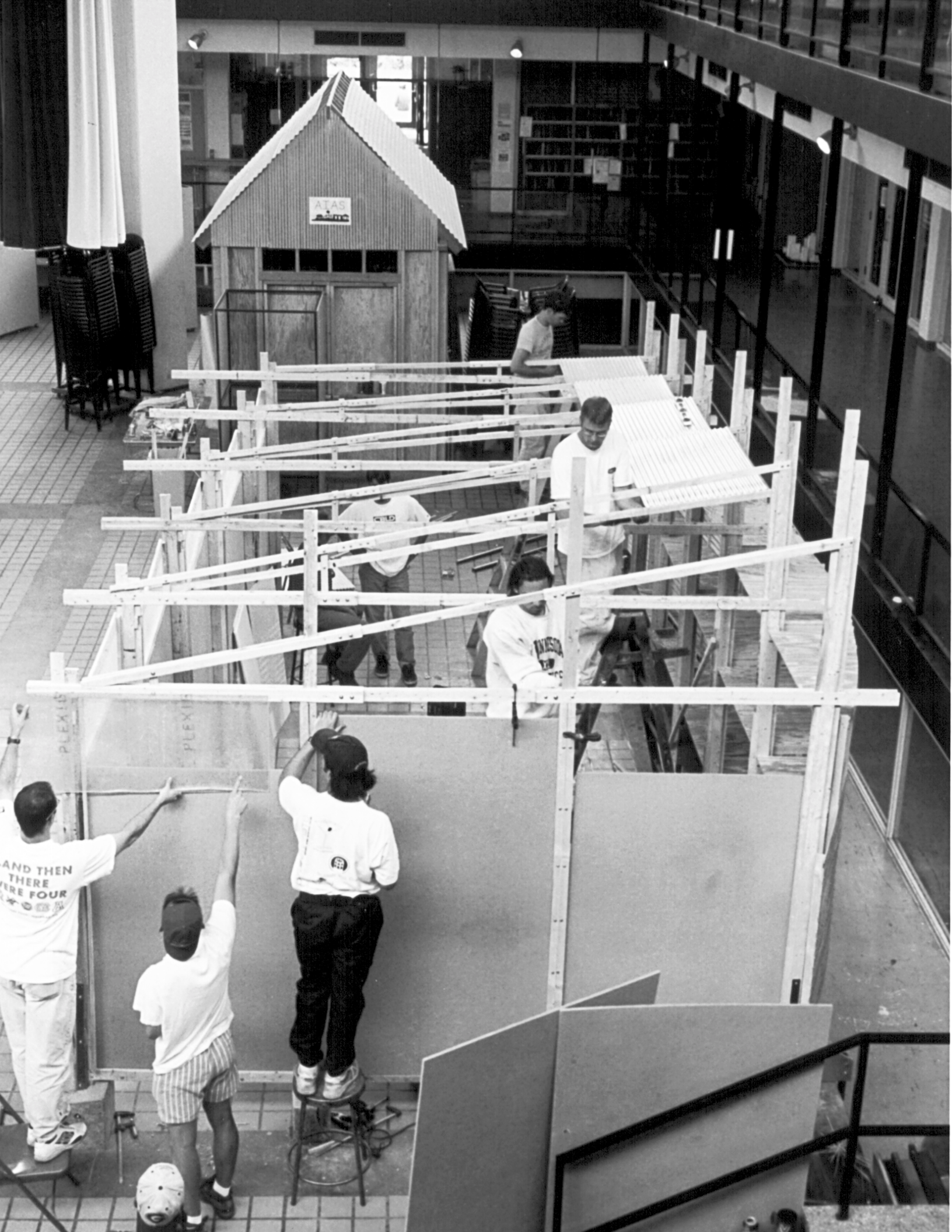
Internship Opportunities

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.

College of Architecture and Landscape Architecture

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College of Architecture and Landscape Architecture

CALA

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 the description, exploration, evaluation, and development of 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 slide library houses a collection of 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 32,000 volumes. The CALA computing center, open seven days a week, supports several operating systems and a wide 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 proposed 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.

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—B.A. students are admitted to the major in architecture after completing required pre-architecture courses and at least 60 credits (including current enrollment) with a 2.50 GPA overall and in Arch-designated courses. 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 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 undergraduate landscape architecture degree; a bachelor of environmental design (B.E.D.); and, in cooperation with the College of Liberal Arts (CLA), a nonprofessional undergraduate bachelor of arts degree (B.A.) with a major in architecture. CALA also offers a second nonprofessional undergraduate architecture degree program that includes an accelerated status option to allow qualified undergraduates to complete the undergraduate and M.Arch. 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*.

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

Minors

Both of CALA's undergraduate degree programs incorporate a minor or elective concentration (a minimum of 18-21 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 a minor in architecture and a minor in 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 (612/296-2388).

Advising

CALA Student Affairs 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. Architecture majors may also be advised by the architecture department's student services adviser; landscape architecture majors may be advised by the department's undergraduate landscape 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—Students may repeat courses in which they receive a grade of D or less. Students are not allowed to repeat for credit courses in which they receive a C or better.

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 Affairs or department offices. Petitions are submitted to the department adviser and then forwarded to the CALA Student Affairs 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 will hear the evidence. Further appeals go to college-level and University-level committees. The CALA program adviser in 110 Architecture Building is a competent source for 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 any student work executed as part of a CALA instructional program. In addition, the college reserves the right to document, reproduce, and publish images of any such student work 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 selected preprofessional and professional courses through University College. Continuing professional education courses and reviews for the architectural registration examination are also offered. For more information, consult the *University College Catalog*.

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, 48 Coffman Memorial Union (612/626-4782); the Global Campus, 102 Nicholson Hall (612/626-9000); or the CALA Student Affairs 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 adds a valuable dimension to a student's academic career and contributes 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. A-Kaffe is a volunteer student-run espresso cart within the Architecture Building. CALA 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
125 Architecture Building,
Minneapolis
626-9068

Student Services
110 Architecture Building,
Minneapolis
626-1000

Departments and Programs

Department of Architecture
110 Architecture Building,
Minneapolis
624-7866

Department of Landscape Architecture

110 Architecture Building,
Minneapolis
625-6860

Design Center for American Urban Landscape

Suite 222, 1313 Fifth Street S.E.,
Minneapolis
627-1850

Landscape Studies Center
1425 University Avenue S.E.,
Minneapolis
625-6860

CALA World Wide Web Site
<www.cala.umn.edu/>

College of Architecture and Landscape Architecture

Degree Program

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

To complete the degree, 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 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)

Geog 1403—Biogeography of the Global Garden (4 cr)

Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)

Geo 1004—Physical and Historical Geology of Minnesota (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 6 credits of social sciences:

Geog 1301—Introduction to Human Geography (4 cr)

Geog 3371—Introduction to Urban Geography (3 cr)

Geog 3373—The Changing Form of the City (3 cr)

II. Advanced Courses

Landscape Architecture

Arch 3301—Drawing for Design in Architecture (3 cr)

Arch 3401—Environmental Design and the Sociocultural Context (3 cr)

LA 3411—Architectural History to 1750 (3 cr)

or LA 3412—Architectural History since 1750 (3 cr)

LA 5413—Introduction to Landscape Architectural History (3 cr)

LA 3501—Environmental Design and its Biological and Physical Context (3 cr)

Phil 3502—Introduction to Aesthetics (4 cr)

LA 3001—Introduction to Landscape Architectural Design (3 cr)

EEB 3001—Ecology and Society (3 cr)

FR 4131—Geographical Information Systems for Natural Resource Analysis (3 cr)

LA 5204—Landscape Ecology (3 cr)

LA 5571—Landscape Construction: Landform Systems and Spatial Performance (4 cr)

The following courses are recommended (not required) to fulfill the three-course (9-12 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)

LA 1101—Introduction to Design Thinking (4 cr)

NRES 3245—Recreation Policy and Landscape-Level Planning (3 cr)

NRES 4395—Natural Resource Planning (3 cr)

PA 5211—Introduction to Land Use Planning (3 cr)

PA 5241—Environmental Planning (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)

Geog 5441—Quaternary Landscape Evolution (3 cr)

Geo 4701—Geomorphology (4 cr)

Geo 4703—Glacial Geology (4 cr)

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 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 form available from the Department of Landscape Architecture, University of Minnesota, 110 Architecture and Landscape Architecture Building, 89 Church Street S.E., Minneapolis, MN 55455 (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 stating the student's reasons for wanting to be a landscape architect, describing previous experiences in landscape architecture and related fields, and identifying interests and life experiences that may relate to 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. 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. Approval for admission is based on

- the student's academic standing and GPA
- the student's maturity and experience
- the student's letter of intent
- the estimated design potential of the student
- the availability of staff and space

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 course (3 cr)

**The University's
Weisman Art Museum
was designed by
Pritzger Prize-
winning architect
Frank Gehry.**

College of Biological Sciences

This is the College of Biological Sciences section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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College of Biological Sciences

CBS

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 76.

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 Administration and Faculty section of this catalog.

Advanced Bioscience Computing Center (ABCC)—In 247 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 (612/624-3110).

General Biology Program—In P180 Kolthoff Hall on the Minneapolis campus, this program administers beginning biology courses for most University students, serving approximately 3,200 students per year. Students meet CBS's finest instructors in these courses and enjoy personal attention in laboratory sections (612/625-6636).

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, 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.

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

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.

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).

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 come from two colleges (Biological Sciences and Agricultural, Food, and Environmental Sciences) and six departments (agronomy and plant genetics, biochemistry, genetics and cell biology, 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 nearly 35 percent choose to go directly on to school for advanced degrees (both graduate and professional degree programs) and that 60 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 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 90 (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 once each month during 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 month a different career is explored, 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 a minimum, 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 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 and have an AAR (ACT Aptitude Rating) score of 135 or higher or SAR (SAT Aptitude Rating) score of 200 or higher. For more information, contact the Office of Student Services (612/624-9717).

Students With at Least 26 Credits

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

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' freshman class has filled, may begin their program as prebiology students in CLA and then transfer to CBS as sophomores or juniors.

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 at least 26 credits). 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 as well as 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. Students are urged to participate; failure to attend results in a late registration date and difficulty obtaining needed courses.

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, 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 is composed of four essential elements. Each is important in preparing students to be leaders in their chosen professions in an increasingly complex and interdisciplinary world.

I. Liberal Education—A liberal education 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 air flow, 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 introduces 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 and cell biology; 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. To explore courses in related areas, see the Course Descriptions section of this catalog and the *School of Public Health Catalog*. A complete list is available in the *Directory of U of M Undergraduate Courses in Life Sciences Disciplines*. This resource, in electronic and booklet form, is available in the Instructional Computing Center in 406 Biological Sciences Center. Biology majors may petition to use many of these courses to count toward the 16 credits of upper-division science/mathematics electives required for the major. Courses are recommended in anatomy (CBN), 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

Conservation Biology—Francesca Cuthbert, 624-1756

Ecology—Elmer C. Birney, 624-6293

Genetic Counseling—Bonnie LeRoy, 624-7193

Microbial Engineering—Friedrich Srienc, 624-9776

*Microbiology, Immunology, and Molecular
Pathobiology*—Marc K. Jenkins, 626-2715

*Molecular, Cellular, Developmental Biology, and
Genetics*—Robert J. Brooker, 624-3053

Neuroscience—Robert F. Miller, 626-2914

Plant Biological Sciences—Alan Smith, 624-9290

Zoology—Elmer C. Birney, 624-6770

Honors Program

The CBS honors program has two components. Freshmen and sophomores participate in the CLA honors program, which is for students in all areas of arts and sciences. The program provides specially designed courses as well as 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 CBS component of the program in their junior year. A minimum of 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 4994, EEB 4994, GCB 4994, MicB 4994, NSc 4994, or PBio 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
 - 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.

Students planning to graduate with honors in microbiology must include specific courses in their programs in addition to meeting college requirements. A list of these requirements may be obtained from the Office of Student Services.

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. To be used for credit toward graduation, each credit of D or D+ must be balanced by a credit of A or B in a course at the same level; each credit of D or D+ earned in courses meeting specific science or mathematics requirements must also be balanced by a credit of A or B in courses at the same level that meet those requirements. Grades of D or D+ are not accepted in Biol 1009—General Biology or Biol 1001-1002—Introductory Biology I-II, Chem 1021-1022—Chemical Principles I-II, Math 1271-1272—Calculus I-II, and their equivalents.

Course Requirements

English Communication Skills—See “Writing Requirement” under “Liberal Education Requirements” in the Policies section 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—Most CBS majors require a minimum of 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 76.

Biological Sciences—Each major has a defined list of required courses in general and organismal biology, as well as components of the biology core curriculum. Requirements are listed with each major beginning on page 76.

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 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

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.

Special Learning Opportunities and Resources

Students are encouraged to explore the full scope of learning experiences available, including those beyond the required curriculum. Many students plan projects they carry out under faculty supervision in research laboratories and in the field. Some students 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.

Minority 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).

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

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).

Undergraduate Research—Each spring an Undergraduate Research Symposium is held to recognize the accomplishments of undergraduates participating in life sciences research projects. Students doing 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 Notebook 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 April 1 and must be accompanied by the *CBS Scholarship Application Cover Sheet*. 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 20 to 25 percent are admitted to professional schools and 15 to 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, as well as 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. The club was established to ensure full participation of students from groups currently underrepresented in science and to foster contact among biology students and faculty. It meets for monthly dinners and discussion and provides both academic and social experiences for its members. For more information, contact Cady Paulaha (612/625-2275).

American Medical Students Association (AMSA)—This local affiliate of the national organization was formed on campus to promote the interests of students interested in medicine, and to sponsor informational programs and activities to help students explore this field. For more information, contact the Office of Student Services (612/624-9717).

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 biochemistry department (612/624-7755).

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 Doris Rubenstein, CBS Alumni Relations, 123 Snyder Hall (612/624-4716), or the Minnesota Alumni Association, 501 Coffman Memorial Union, 300 Washington Avenue S.E., 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. 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).

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 and Cell Biology 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 and cell biology 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 (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)

Office of the Dean

123 Snyder Hall (St. Paul)
624-2244

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belde@cbs.umn.edu

Kathryn Hanna, assistant dean
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Student Services

Advising and Registration

223 Snyder Hall (St. Paul)
624-9717

CBS-advisor@CBS.umn.edu

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Leah Clark
Becky Weiss

Biology Colloquium

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626-1674

Kathryn Hanna, khanna@cbs.umn.edu
Kendall Corbin

Velta Sparmins
James Waddell

Career Center

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Kathleen Peterson, kathiep@cbs.umn.edu
Amy Winkel

Community Outreach and Freshman Programming

223 Snyder Hall (St. Paul)
624-9717

Paul Germscheid
Melissa Weber

Services for Disabled Students

124E Snyder Hall (St. Paul)
624-1257

Kathy Ball

Honors Program

223 Snyder Hall (St. Paul)
625-5296

Franklin Barnwell

International Education

610 Biological Sciences Center (St. Paul)
625-1958

Willard Koukkari

Minority Affairs

123 Snyder Hall (St. Paul)
625-8752

Verna Holoman, vholoman@cbs.umn.edu

Professional Learning Experience Program

213 Snyder Hall (St. Paul)
624-9270

Amy Winkel

Recruitment and Retention for the Life Sciences

123 Snyder Hall (St. Paul)
625-8752

Verna Holoman, vholoman@cbs.umn.edu

Departments, Institutes, and Programs

Advanced Bioscience Computing Center

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

Alumni Relations

123 Snyder Hall (St. Paul)
624-4716

Doris Rubenstein

Biochemistry, Molecular Biology, and Biophysics

140 Gortner Laboratory of Biochemistry
(St. Paul)
624-7755

Charles Louis, head, louis003@tc.umn.edu

Biolink/Master of Biological Sciences

123 Snyder Hall (St. Paul)
625-3133

James Fuchs, faculty advisor

Biological Process Technology Institute

240 Gortner Laboratory of Biochemistry
(St. Paul)
624-6774

Kenneth Valentas, director,
valentas@cbs.umn.edu

Cedar Creek Natural History Area

509 Ecology Building (St. Paul)
625-5743

Cedar Creek area
434-5131

G. David Tilman, director,
tilman@lter.umn.edu

Developmental Biology Center

4-122 Malcolm Moos Health Sciences Tower
(Mpls.)
624-3110

Chris Wylie, director,
wylie@lenti.med.umn.edu

Ecology, Evolution, and Behavior

100 Ecology Building (St. Paul)
625-5700

Robert W. Sterner, interim head
stern007@tc.umn.edu

Electronic Instrument Services

25 Biological Sciences Center (St. Paul)
625-8267

General Biology Program

P180 Kolthoff Hall (Mpls.)
625-6636

John S. Anderson, director,
ander049@tc.umn.edu

Genetics, Cell Biology, and Development

248A Biological Sciences Center, (St. Paul)
624-3003
gcd@biosci.cbs.umn.edu

Imaging Center

35 Snyder Hall, (St. Paul)
624-3454

Mark Sanders, director,
msanders@cbs.umn.edu

Information Technology

122 Snyder Hall (St. Paul)
625-9284

Debbie Parker, coordinator,
dparker@cbs.umn.edu

Institute of Human Genetics

4-122 Malcolm Moos Health Sciences Tower
(Mpls.)
624-3110

Harry Orr, director, ihg@gene.med.umn.edu

Instructional Computing Center

406 Biological Sciences Center (St. Paul)
625-2273

Lake Itasca Program

220 Biological Sciences Center (St. Paul)
625-1799

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Microbiology (Medical School)

1460 Mayo Memorial Building (Mpls.)
624-4442

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Networking Services

122 Snyder Hall (St. Paul)
625-9284

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6-255 Millard Hall (Mpls.)
625-7623

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Plant Biology

220 Biological Sciences Center (St. Paul)
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Plant Molecular Genetics Institute

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121 Biological Sciences Center (St. Paul)
624-2789

Jane Phillips, coordinator

Directors of Undergraduate Studies

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158 Gortner Laboratory of Biochemistry
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624-6275

Janet Schottel, janet@biosci.cbs.umn.edu

Biology

123 Snyder Hall (St. Paul)
624-2244

Kathryn Hanna, khanna@cbs.umn.edu

Ecology, Evolution, and Behavior

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624-7238

Richard Phillips, phill001@tc.umn.edu

Genetics, Cell Biology, and Development

250 Biological Sciences Center (St. Paul)
625-2243

William Herman,
wherman@biosci.cbs.umn.edu

Microbiology

1005 Mayo Memorial Building (Mpls.)
624-9933

Leslie Schiff, schiff@lenti.med.umn.edu

Neuroscience

6-255 Millard Hall (Mpls.)
625-7623

Richard Poppele, dick@neuro.med.umn.edu

Plant Biology

768 Biological Sciences Center (St. Paul)
625-2761

Thomas Soulen, soule001@tc.umn.edu

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

To complete the degree, 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.

Note: Grades in Biol 1009, 1001, and 1002 must be at least C- (1.67).

Biology Core—Complete each of the following:

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

Biol 4003—Genetics

Plus choose option a or b:

a. Biol/MicB 3301—Biology of Microorganisms

b. Biol 4004—Cell Biology, and 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 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 Gene Action and Biological Regulation

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 a 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—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 Math 1271 and 1272, and Chem 1021 and 1022 must be at least C-.

Minor Requirements

Students must complete BioC 4331, 4332, and 4025.

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.

Biology

B.S.

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.S. program can prepare students for further study in graduate or professional schools, and train other students for careers in industry, education, or government.

Degree Requirements

To complete the degree, 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

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 Biol 1009, 1001, and 1002 must be at least C-.

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

The following courses must be taken A-F, unless the course is only offered S-N.

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

Note: Grades in Math 1271, Math 1272, Chem 1021, and Chem 1022 must be at least C-.

*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.

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

To complete the degree, 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 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

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

Note: Grades in Biol 1001, 1002, and 1009 must be at least C-.

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry

At least two courses from Biol 3407, Biol 3409, Biol 3411

Ecology, Evolution, and Behavior

Genetics and Cell Biology

Microbiology

Neuroscience

One course or course pair in either genetics (Biol 4003 or GCB 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. Students unable to attend a field station may satisfy this requirement by completing three courses from the following list: EEB 4134, EEB 4129 and either EEB 4014 or EEB 4016.

Required Courses From Other Programs

The following courses must be taken A-F, unless the course is offered S-N only.

Math 1271-1272—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 Math 1271 and Math 1272, Chem 1021 and Chem 1022 must be at least C-.



Genetics and Cell Biology

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

To complete the degree, 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. 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

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 3301

Note: Grades in Biol 1009, 1001 and 1002 must be at least C-.

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, GCB 4143, GCB 5034, Psy 5137

At least one course in cell biology from GCB 4111, GCB 5036, GCB 4134, MicB 4131, PBio 5414

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

One laboratory course from the following: BioC 4025, Biol 4125, GCB 4015, GCB 4025

At least 2 credits of GCB 4994—Directed Research. At least 2 credits and a maximum of 6 credits of GCB 4994 may be applied toward the 18-credit total.

Biol 3700 is recommended.

Required Courses From Other Programs

The following courses must be taken A-F, unless the course is only offered S-N.

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

Note: Grades in Math 1271, Math 1272, Chem 1021, and Chem 1022 must be at least C-.

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.

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

To complete the degree, 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. 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 1001–1002—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: GCB 3022 or Biol 4003

Microbiology courses: 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 4994—Directed Research

Required Courses From Other Programs

The following courses must be taken A-F, unless the course is only offered S-N.

Math 1271-1272—Calculus I-II

Chem 1021-1022—Chemical Principles I-II

Chem 2301-2302—Organic Chemistry I-II, Chem 2311—Organic Lab

Phys 1301-1302—Introductory Physics I-II

or Phys 1201-1202—General Physics I-II

Chem 2101-2111—Introductory Analytical Chemistry Lecture and Lab

Note: Grades in Math 1271 and 1272, Chem 1021 and 1022 must be at least C-.

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

To complete the degree, 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. 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

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

Note: Grades in Biol 1009, 1001, and 1002 must be at least C-.

Biology Core—Complete each of the following:

Biol/BioC 3021—Biochemistry

or BioC 4331—Biochemistry I: Structure, Catalysis, Metabolism and Bioenergetics of 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/Phsl 3101—Introduction to Neuroscience I: From Molecules to Madness

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

Biol 3105-3115—Neurobiology Laboratory I-II

At least 2 credits of Track 1 or 2

Track 1: NSc 4994—Directed Research

Track 2: NSc 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 2005; Biol 3005; Biol 3007; Biol/MicB 3301; Biol/MicB 2032; 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 4111; GCB 4015; GCB 4025; GCB 4994; MicB 4215; MicB 4235; MicB 4994; PBio 4321; PBio 4404; PBio 4511; PBio 5416; PBio 4994; any CBS course offered at the Lake Itasca Forestry and Biological Station (x8xx).

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/Phsl 5461, BioC/MdBc/Phsl 5444

Group B—Sensory and motor systems

EEB 5323, NSc/Psy 5031, NSc/Psy 5034, NSc 5481, Psy 3031, Psy 5036, 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

The following courses must be taken A-F, unless the course is only offered S-N.

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

Note: Grades in Math 1271, Math 1272, Chem 1021, and Chem 1022 must be at least C-.

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

To complete the degree, 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. All courses in the following list 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

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.

Note: Grades in Biol 1009, 1001, and 1002 must be at least C-.

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 2005; Biol/MicB 3301; Biol/MicB 2032; 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 4111; GCB 4015; GCB 4025; GCB 4994; MicB 4215; MicB 4235; MicB 4994; NSc 4994; PBio 4321; PBio 4404; PBio 4511; PBio 5416; PBio 4994; or any 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

All courses that follow must be taken A-F, unless the course is only offered S-N.

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

Note: Grades in Math 1271, Math 1272, Chem 1021, and Chem 1022 must be at least C-.

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

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.

Dental Hygiene

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Dental Hygiene

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 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.

Preference is given to applicants who have completed the University of Minnesota's high school preparation requirements. See "Freshman Admission" in the General Information section of this catalog. If not completed before admission into the program, these requirements must be completed during the summers and before graduation.

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 World Wide 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) 625-2006.

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 have been 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 0854) at least 10 weeks before any scheduled test date. If you live in the Twin Cities area, you may register for the MELAB with the Minnesota English Center, 320 16th Avenue S.E., University of Minnesota, Minneapolis, MN 55455, or call (612) 624-1503. To register for the MELAB outside the Twin Cities area, contact the English

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

Language Institute, Testing and Certification Division, University of Michigan, Ann Arbor, MI 48109, or call (313) 764-2416.

Students admitted to the Division of Dental Hygiene and who require accommodation for a disability should contact the Office of Disability Services at (612) 626-7379 before the beginning of the semester of entry into the program.

Degrees

The School of Dentistry Division of Dental Hygiene offers two program tracks leading to a bachelor of science degree in dental hygiene.

The B.S. degree program track is designed for entry-level students; the B.S. degree-completion program track is tailored to students who have completed an associate degree program in dental hygiene at a regionally accredited institution and who want to earn a baccalaureate degree.

Policies

Students who have been admitted to the program must submit documentation of immunizations required by the University and are strongly encouraged to have completed a physical assessment examination. Students must provide evidence of completion of a Hepatitis B vaccination and tuberculin test or chest X-ray during the first year in the program.

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 St. S. E., Minneapolis, MN 55455; fax: (612) 626-6096. In addition, the division works closely with CLA's pre-health science advisers in 30 Johnston Hall at (612) 624-9006.

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 during a 15-day period.

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.

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

Administrative Offices

Office of the Director

Kathleen J. Newell, R.D.H., Ph.D.
Director and associate professor
9-436 Malcolm Moos Health Sciences Tower
515 Delaware St. S.E.
Minneapolis, MN 55455
(612) 625-9121
Fax: (612) 626-6096
E-mail: newel001@tc.umn.edu

Student Services and Advising

Karen Smith, Admissions Secretary
9-436 Malcolm Moos Health Sciences Tower
515 Delaware St. S.E.
Minneapolis, MN 55455
(612) 625-9121
Fax: (612) 626-6096
E-mail: smith093@tc.umn.edu

School of Dentistry Web Page

<www.umn.edu/dental>



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

To complete the degree, students must complete at least 120 credits.

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; most credits completed at other schools will apply toward this total. 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 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
 Phcl 3001—Pharmacology
 Phsl 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

College of Education and Human Development

This is the College of Education and Human Development section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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On the Day You Were Born



Debra Frasier

HBJ

HARCOURT BRACE JOVANOVIĆ, PUBLISHERS



College of Education and Human Development

CEHD

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 700 undergraduate students, 2,500 graduate students, and 125 faculty.

CEHD's mission is to generate knowledge about teaching, learning, and human development and apply that knowledge to improve education for all individuals. One of the things that sets the college apart from other colleges of education 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.

Admission to CEHD is decided on the basis of academic standards and other factors, which vary somewhat 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 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 should 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. *Students applying for majors in foundations of education: elementary; kinesiology; recreation, park, and leisure studies; and sport studies* must also submit an SPS application to 110 Wulling Hall.

Programs of Study

CEHD is a professional school focused on both undergraduate and advanced study, offering programs of study in a wide range of education and human development disciplines. Students can prepare for careers in government, business, and community settings as well as in education in either formal or nonformal 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 service/development.

Minor

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.

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 in 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 Student Scholastic Standing Committee.

Certification/Licensure

Certification

The college offers three certificates at the undergraduate level: coaching, sport management, and human resource development. 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).

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 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.

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 98 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.

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.

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 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. Members receive a variety of benefits, including 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-UM ALUMS.

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, school and clinical settings, and a broad range of other occupations. 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).

*College of
Education and
Human
Development*

*General
Information*

*Agricultural
Education*

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

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/students/>
625-6501, fax 626-1580
e-mail: spsinfo@tc.umn.edu

Academic Progress
Admission
Advising
Career Services
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>
Susan Hupp, chair
624-3543

Institute of Child Development

180 Child Development Building, Minneapolis
<icd.coled.umn.edu>
Richard Weinberg, 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

College of Education and Human Development

Degree Programs

Agricultural Education

Department of Work, Community, and Family Education

B.S.

Agricultural Science and Technology Education Specialization

This undergraduate specialization is a collaborative partnership by CEHD and the College of Agricultural, Food, and Environmental Sciences. It 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 maintain an overall GPA of 2.75 and complete the Praxis I: Preprofessional Skills Test (PPST).

Degree Requirements

To complete the degree, students must complete at least 128 credits, including required courses in the major. 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 student teaching experience.

Required Courses

Students must meet the University's liberal education requirements. In addition, students must meet the following requirements.

Prerequisites (44-46 cr)

Prerequisite courses may apply toward liberal education requirements—see adviser.

Communications (10 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 (3 cr)

Core Sciences (19-21 cr)

Chem 1011—General Principles of Chemistry (4 cr)

BioC 1012—General Principles of Biochemistry (3 cr)

Biol 1009—General Biology (4 cr)

or Biol 1051—Introduction to Environmental Science (3 cr)

MicB 2022—General Microbiology (2 cr)

Phys 1001—The Physical World: Energy and Its Impact on the Environment (4 cr)

or Phys 1101—Fundamental 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 (12 cr)

HSci 1814—Introduction to History of Science: Ancient Study (4 cr)

HSci 1815—Introduction to History of Science: Modern Science (4 cr)

Psy 1001—Introduction to 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 1103—Crops, Environment, and Society (4 cr)

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

Hort 1001—Plant Propagation (4 cr)

Hort 1002—Home Horticulture (3 cr)

Hort 1012—Woody Landscape Plants (4 cr)

Hort 1013—Interior Floral and Foliage Design (3 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 3203—Environment, Global Food Production, and Citizens (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:

AgEE 2051—Current Technical Competencies (3 cr)

AgEE/BIE 3112—Technical Drawing and Production Technologies (3 cr)

AgEE/BIE 3121—Communication, Energy, Power, and Machinery Technology (3 cr)

Food Science (3 cr)

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

Professional Education (40 cr)

Foundations (15 cr)

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

Agricultural Education (15 cr)

- AgEE 1001—Introduction to Agricultural Education (1 cr)
- AgEE 1002—Career Planning for Agricultural Professionals (1 cr)
- AgEE 2096—Professional Practicum: Early Experience (1 cr)
- AgEE 5111—Agricultural Education Methods of Teaching (4 cr)
- AgEE 5112—Agricultural Education Program Organization and Curriculum for Youth (4 cr)
- AgEE 5113—Agricultural Education Adult Program Development and Technology (3 cr)
- AgEE 5114—Agricultural Education Seminar (1 cr)

Work, Community, and Family Education (10 cr)

- WCFE 5301—Philosophy and Practice of Vocational Education (2 cr)
- WCFE 5697—Teaching Internships: School and Classroom Settings (2 cr)
- WCFE 5698—Teaching Internship (6 cr)

B.S.

Agricultural Leadership, Training, and Development Specialization

The 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.

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.

Degree Requirements

To complete the degree, students must complete at least 124 credits, including required courses in the major. The degree requirements for this program require the completion of the courses and business experience. Students must maintain an overall GPA of 2.00.

Required Courses

Students must meet the University's liberal education requirements. In addition, students must meet the following requirements.

Prerequisites (35 cr)

Prerequisite courses may apply toward liberal education requirements—see adviser.

Communications (10 cr)

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

Mathematics (3 cr)

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

Physical and Biological Sciences (14 cr)

- Agro 1103—Crops, Environment, and Society (4 cr)
- or Biol 1009—General Biology (4 cr)
- BioC 1012—General Principles of Biochemistry I (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)

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 (3 cr)
- Agro 2501—Weed Biology and Systematics (2 cr)
- Agro 3005—Applied Crop Physiology and Development (2 cr)
- AnSc 3203—Environment, Global Food Production and Citizens (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 3203—Environment, Global Food Production and Citizens (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)

- AgEE 2051—Current Technical Competencies (3 cr)

Emphasis Area

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 credit)
- Agro 2105—Seed Technology (1 credit)
- Agro 2501—Weed Biology and Systematics (2 cr)
- Agro 3203—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 1152—Writing on Issues of Science and Technology (3 cr)

- Rhet 3221—Theories of Human Communications (3 cr)

- Rhet 3257—Scientific and Technical Presentations (3 cr)

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

- Rhet 3401—Accessing Information Through Electronic Media (3 cr)

Agricultural Leadership and Development (6 cr)

AgEE 4221—Rural Leadership Development (3 cr)

AgEE 5361—World Development Problems (3 cr)

Experiential Education (3 cr)

AgEE 3096—Experiential Learning: Production and Business (3 cr)

Agricultural Education and Extension (9 cr)

AgEE 1001—Introduction to Agricultural Education (1 cr)

AgEE 1002—Career Planning for Agricultural Professionals (1 cr)

AgEE 5111—Agricultural Education Methods of Teaching (4 cr)

AgEE 5311—History, Philosophy, and Systems of Agricultural Extension Systems (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)

B.S.

Natural and Managed Environmental Education Specialization

The 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 2.75 and complete the Praxis I: Preprofessional Skills Test (PPST).

Degree Requirements

To complete the degree, students must complete at least 128 credits, including required courses in the major. The specialization requires a broad study in agriculture focused on the natural and managed environmental education areas. Areas of study include 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 student teaching experience.

Required Courses

Students must meet the University's liberal education requirements. In addition, students must meet the following requirements.

Prerequisites (39-41 cr)

Prerequisite courses may apply toward liberal education requirements—see adviser.

Communications (9-10 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 (3 cr)

Mathematics (3 cr)

Math 1031—College Algebra and Probability (3 cr)

Physical and Biological Science (19-20 cr)

BioC 1012—General Principles of Biochemistry (3 cr)

Biol 1009—General Biology (4 cr)

or Biol 1051—Introduction to Environmental Science (3 cr)

Chem 1011—General Principles of Chemistry (4 cr)

MicB 2022—General Microbiology (2 cr)

Phys 1001—The Physical World: Energy and Its Impact on the Environment (4 cr)

or Phys 1101—Fundamental Physics I (4 cr)

ScAg 1501—Biotechnology, People, and the Environment (3 cr)

Social Science (8 cr)

Psy 1001—Introduction to Psychology (4 cr)

HSci 1814—Introduction to History of Science: Ancient Study (4 cr)

or HSCI 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 (3 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 (4 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 3203—Environment, Global Food Production, and Citizens (3 cr)

Agricultural Mechanization (6 cr)

Select 6 credits from the following:

AgEE 2051—Current Technical Competencies (3 cr)

AgEE/BIE 3112—Technical Drawing and Production Technologies (3 cr)

AgEE/BIE 3120—Communication, Energy, Power, and Machinery Technology (3 cr)

Food Science (3 cr)

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

Professional Education (40 cr)

Foundations (15 cr)

EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)

EdHD 5003—Developmental and Individual Differences (3 cr)

EdHD 5005—School and Society (2 cr)

EdHD 5007—Technology for Teaching and Learning (1.5 cr)

EdHD 5009—Human Relations (1 cr)

EdPA 5341—The American Middle School (3 cr)

PubH 5003—Fundamentals of Alcohol and Drug Abuse (1.5 cr)

Agricultural Education (15 cr)

AgEE 1001—Introduction to Agricultural Education (1 cr)

AgEE 1002—Career Planning for Agricultural Professionals (1 cr)

AgEE 2096—Professional Practicum: Early Experience (1 cr)

AgEE 5111—Agricultural Education Methods of Teaching (4 cr)

AgEE 5112—Agricultural Education Program Organization and Curriculum for Youth (4 cr)

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

AgEE 5114—Agricultural Education Seminar (1 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.

Work, Community, and Family Education (10 cr)

- WCFE 5301—Philosophy and Practice (2 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 industrial technology education) and vocational and technical education (technical college teaching). Students may take courses meeting requirements for a combination of focuses. This would require taking additional industrial training courses. Graduate study also is available in both focuses.

General Industrial Education Focus (prelicensure)

Students completing the general industrial education (prelicensure in industrial 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 industrial technology education. Completing the M.Ed./initial licensure program usually results in recommendation for licensure to teach industrial technology education in grades 5-12 in Minnesota public schools.

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)
Teacher Education Sequence—TES is not required of students who have completed the balance of the TES requirements.
- BIE 5325—Foundations of Industrial Education (3 cr)
- BIE/HRD 5601—Student and Trainee Assessment (3 cr) TES
- BIE/HRD 5628—Multimedia Presentations in Business (3 cr)
- BIE/HRD 5629—Course Development in Business and Industry (3 cr)
- 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/AgEE 3112—Technical Drawing and Production Technologies (3 cr)
- BIE 3113—Manufacturing Technology (3 cr)
- BIE 3114—Construction Technology (3 cr)
- BIE/AgEE 3121—Communication, Power and Energy, Transportation and Machinery Technologies (3 cr)
- BIE 3122—Communication and Information Technology (3 cr)
- BIE 3123—Energy, Power, and Transportation and Technologies (3 cr)
- BIE 5101—Technological Problem Solving (3 cr)

Advanced Technology Content (12 cr)

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

Additional Requirements (9-14 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—Workshop in Human Relations (3 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 5023—Basic Concepts of Personal and Community Health (3 cr)
- or PubH 3004—Basic Concepts of Personal and Community Health (4 cr)
- or PubH 3001—Personal and Community Health (2 cr)
and PubH 3003—Fundamentals of Drug and Alcohol Abuse (2 cr)
- or PubH 5022—Personal and Community Health (2 cr)
and PubH 5003—Fundamentals of Drug and Alcohol Abuse (2 cr)
- WCFE 5301—Philosophy and Practice of Vocational Education (3 cr) TES, 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 business education majors; 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 licensure requirements for the field in which they wish to teach.

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)
Teacher education sequence (TES), required for initial state vocational licensure (not required of students who have completed the balance of the TES requirements).
 - 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 (3 cr) TES
 - BIE/HRD 5629—Course Development for Business and Industry (3 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 3011/5011—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 (1-12 cr)

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

BIE 5596—Occupational Experience in Business and Industry (1-5 cr/ max 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 (1-12 cr)

BIE 5012—Advanced Word Processing Practicum (3 cr)

BIE 5013—Spreadsheet Analysis Using Microcomputers (3 cr)

BIE 5014—Database Microcomputer Applications (3 cr)

BIE 5015—Integrated Microcomputer Applications in BIE (3 cr)

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

BIE 5596—Occupational Experience in Business and Industry (1-5 cr/ max 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 in BIE (3 cr)

EPsy 5135—Workshop in Human Relations (3 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 5023—Basic Concepts of Personal and Community Health (3 cr)

or PubH 3004—Basic Concepts of Personal and Community Health (4 cr)

or PubH 3001—Personal and Community Health (2 cr)

and PubH 3003—Fundamentals of Drug and Alcohol Abuse (2 cr)

or PubH 5022—Personal and Community Health (2 cr)

and PubH 5003—Fundamentals of Drug and Alcohol Abuse (2 cr)

WCFE 5301—Philosophy and Practice of Vocational Education (3 cr)

Teacher education sequence, 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 business education majors with adviser approval.

Coaching

School of Kinesiology and Leisure Studies

Minor Only

The coaching minor provides University students with the opportunity to receive in-depth background into 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.

Admission Requirements—Admission is open to all University students.

Program Completion Requirements (29 cr)

A 2.50 GPA in courses submitted for completion of the coaching minor is required for the minor to be awarded.

Required Courses

Kin 3111—Human Anatomy (2 cr)

or CBN 1027—Anatomy for Kinesiology Students (3 cr)

Kin 3113—First Responder for Coaches and Athletic Trainers (3 cr)

or current American Red Cross Standard First Aid and CPR cards

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 (3 cr)

Two courses from Kin 5136, Kin 5126, Kin 3112, Kin 4385, 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

Electives—Any course for which a student has appropriate prerequisites and that has been approved by the adviser relative to programmatic focus can be used toward this minor.

Final Project

Kin 5697—Student Teaching: Coaching consists of two parts. The first 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 involves 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 an 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, 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 nonlicensure or other settings in which a strong liberal education is useful.

Admission Requirements—Completion of 60 credits in specified courses (contact SPS), a 2.50 overall GPA (higher recommended), education-related experience with grades 1 through 6, experience with diverse populations.

Degree Requirements

To complete the degree, students must complete at least 126 credits, including 35 credits in the major.

Required Courses

Prerequisites

CI 1001—Introduction to the Elementary School (3 cr)

Psy 1001—Introduction to Psychology (4 cr)

Introductory Block

CI 5111—Introduction to Elementary School Teaching (3 cr)

CI 5183—Applying Instructional Methods in the Classroom (1 cr)

EdHD 5001—Learning, Cognition, and Assessment in the Schools (3 cr)

Special Education Core

CI 5183—Applying Instructional Methods in the Classroom (1 cr)

EPsy 5613—Foundations of Special Education I (3 cr)

EPsy 5614—Foundations of Special Education II (3 cr)

EPsy 5616—Behavior Analysis and Classroom Management (3 cr)

Courses for Junior and Senior Year

EdHD 5003—Developmental and Individual Differences (3 cr)

EdHD 5005—School and Society (2 cr)

EdHD 5007—Technology for Teaching and Learning (1.5 cr)

EdHD 5009—Human Relations (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 develop 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 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.

Admission Requirements—Undergraduate GPA of 2.80. If students have a GPA between 2.50 and 2.80, they may be admitted upon completing HRD 5001—Survey: Human Resource Development and Adult Education; HRD 5201—Personnel Training and Development; and HRD 5301—Organization Development, with a GPA of 3.00.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including at least 40 credits in the major. All human resource development students must complete a core of 21 credits consisting of courses in training and development, organization development, and adult education. Students also must complete an internship. Students also must complete the University's liberal education requirements, including some specified courses within those requirements (contact SPS). An overall GPA of 2.80 is required for graduation.

Required Courses

General Courses

One lower division writing course

One upper division writing course

One speech performance course

One microeconomics or macroeconomics course

Psy 1001—Introduction to Psychology (4 cr)

One college-level math course

Human Resource Development (21 cr min)

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

HRD 5201—Personnel Training and Development (3 cr)

HRD 5301—Organization Development (3 cr)

BIE 5661—Instructional Methods in Business and Industry (2 cr)

or AdEd 5101—Strategies for Teaching Adults (3 cr)

HRD 5196—Internship: HRD (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)

Additional courses, to meet the 21 credit total, are to be selected from remaining HRD courses and may include:

WCFE 5121—Principles of Supervisory Management (3 cr)

FE 5201—Education for Work-Family Relationships (3 cr)

Required Related Coursework

WCFE 3010/5010—Technology and Public Ethics (3 cr)

BIE 5010—Introduction to Microcomputer Applications (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 listed under M.Ed. in applied kinesiology.

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 in kinesiology 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
- Completion of at least 45 credits, including the following courses that partially fulfill the University's liberal education requirements for graduation:
 - One 3-credit speech performance course
 - One statistics course
 - One course each in biology and chemistry (both with labs)
 - Psy 1001—Introduction to Psychology (4 cr) (grade of C or higher recommended)
- CBN 1027—Anatomy for Kinesiology Students (3 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 completing this program with a total of 120 credits, including 54 credits in the major, and a 2.50 GPA both overall and in major courses receive the B.S. degree in kinesiology. Courses are listed in the *Class Schedule* under kinesiology and numbered above 1800. Students must complete the University's liberal education requirement.

Required Courses

- CBN 1027—Anatomy for Kinesiology Students (3 cr)
- Kin 1871—Introduction to Kinesiology (2 cr) (pre-admission course)
- Kin 3112—Biomechanical and Task Analysis (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 (3 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)

One advanced writing course (3 cr or more)

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 (1-4 cr)

Kin 3696—Supervised Practical Experience (1-10 cr)

Kin 5697—Student Teaching: Coaching (3 cr minimum)

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, sport management, and therapeutic recreation. Many students couple recreation, park, and leisure studies with course work 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 include commercial recreation, outdoor recreation/education, or public parks and recreation
- therapeutic recreation emphasis areas include community-based or clinical-based recreation. (Completion of this program meets the requirements for certification by the National Council on Therapeutic Recreation Certification.)

Admission Requirements—Completion of a minimum of 30 semester credits of the University's liberal education requirements, including the writing skills requirement; a 2.00 minimum overall GPA, with preference given to applicants with a higher average; relevant education- or career-related experience, paid or volunteer.

Degree Requirements

Students completing this curriculum with a total of 128 credits, including 78 credits in the major, and a minimum 2.50 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 quarter after admission.

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

Students must complete the University's liberal education requirements; appropriate related and major courses may be applied toward these requirements.

Required Courses

Psy 1001—Introduction to Psychology (4 cr)
PubH 3003—Fundamentals of Alcohol and Drug Abuse (2 cr)
Rec 1501—Orientation to Leisure and Recreation (3 cr)
Rec 3281—Research and Evaluation in Recreation, Park, and Leisure Studies (4 cr)
Rec 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 (15 cr)
13 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 certified 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 15-credit senior internship (Rec 3796). Students should see their adviser and the internship coordinator no later than the early part of the semester preceding registration for Rec 3796. An internship manual may be obtained from the division office or from the internship coordinator.

Sport Studies

School of Kinesiology 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, lifetime fitness and health, sport history and philosophy, sport facilities and equipment, sport promotion, sport officiating, sport injuries, and 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 topics: coaching, pre-sport management, or youth services/development.

Admission Requirements—Completion of 40 semester credits of liberal education requirements; completion of 50 semester credits of prerequisite courses (contact SPS); and a 2.00 overall GPA before the April 15 admission deadline.

Degree Requirements

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

A GPA of 2.50 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 3301—Gender and Diversity in Sport (2 cr)
SpSt 3501—Sport and Society (2 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 (2 cr)
SpSt 3996—Practicum: The Sport Experience (8 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: Personal and Community Health (4 cr)
or PubH 3001—Personal and Community Health (3 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)

Focused Elective (20 cr min)

In consultation with the sport studies major adviser, each student selects a minimum of 20 credits from one of the following three sets of focused electives as listed below:

- Coaching
- Pre-sport management
- Youth service/development

Other courses may be included with the adviser's approval.

General College

This is the General College section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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General College



General College (GC) enrolls, and prepares for admission to University degree programs, students who require special preparation because of personal circumstances or previous education.

To serve its students and fulfill its mission, GC faculty members create curricula that support students' acquisition of abilities and knowledge needed for success at the University. The GC curriculum emphasizes communication and computational skills integrated with liberal education, focuses on preparation for transfer and for baccalaureate study in a variety of programs, and seeks to develop students' abilities to bring together educational and career goals in a multidisciplinary and multicultural setting.

The *General College Student Workbook* provides "Base Curriculum" registration requirements, registration procedures and deadlines, academic progress information and requirements, and suggestions for beginning the process of academic planning. The workbook is distributed to new students during orientation or may be obtained from the Student Information Center, 25 Appleby Hall.

GC is housed primarily in Appleby Hall on the east bank of the Minneapolis campus. GC was founded in 1932. For more than 60 years, GC has evolved to meet the changing needs of a range of students seeking access to higher education through the University. GC offers a number of courses through University College (UC). Such courses are offered both on campus and off campus (in several high schools and community settings). Complete information about these courses is available in the current *University College Catalog*.

Application/Admission

Each year, GC receives more than 3,000 applications and enrolls 825 new students, most of them in fall. For more information, students should contact the Office of Admissions. (See also "Admissions and Prospective Student Services" in the General Information section of this catalog.)

Requirements for Admission—For regular admission, students must have a high school diploma and an AAR score of 70 or above. An AAR score is computed by doubling the ACT composite score and adding to that number the high school rank percentile (HSR %). For example, if the ACT composite score is 20 and the HSR % is 45, the AAR score is computed as follows: $40 \text{ (ACT score of } 20 \times 2) + 45 \text{ (HSR \%)} = 85 \text{ (AAR)}$.

Admission by Individual Applicant Review—If the AAR score is 69 or below, or the student has no ACT score or is applying with a GED, they must participate in the Individual Applicant Review (IAR) process and may need to submit additional information. Admission by the IAR process is available for Minnesota residents only.

The *ACT Assessment Program Test*, though not required for admission, is required before a student can attend orientation and register for courses. Students should take the ACT as early as possible, no later than May 1. Students who have applied to GC but have not taken the ACT may arrange to do so by contacting University Counseling & Consulting Services in Eddy Hall (612/624-3510).

In addition to a high school diploma and AAR score, the *Michigan English Language Assessment Battery (MELAB)* is required of all non-native speakers of English (not on an international student visa) who have been in the United States less than eight years. A *minimum score of 65* on the MELAB is a precondition for being admitted to GC for fall semester. ACT English and reading subscores of 18 or higher will exempt a student from the MELAB test and minimum score requirement. Students with MELAB scores of 65 to 79 will be required to take GC's Commanding English (CE) program. CE admits students during fall semester only; consequently, non-native speakers of English who seek spring semester admission must score at least 80 on the MELAB to be admitted. Priority for filling the Commanding English program spaces will be given to Minnesota residents.

International Applicants—GC currently does not admit international applicants on a student visa.

Transfer Students—Transfer students from another college must have no more than 26 semester college credits, with a GPA of at least 2.00, to be considered for admission.

Application Deadlines—Early application is strongly advised. All parts of the application, together with required documentation and application fee, must be completed and on file in the University's Office of Admissions in 240 Williamson Hall according to the following schedule:

Applications will be reviewed beginning on the opening review date until GC's admission goal is reached for that semester. Admissions will then be closed.

Joint GC/UC Classes—GC students whose initial registration is through UC must attend GC's two-day orientation and comply with the Base Curriculum requirements to maintain admission in GC and be eligible for financial aid and some GC student services.

Confirmation Fee—Students who are admitted to a Twin Cities college as freshmen for fall semester must submit a nonrefundable \$85 confirmation fee by May 1. Students must pay the fee by the deadline or within two weeks after the date on the admission notification letter (whichever is later). If a student does not submit the fee by the deadline, their admission may be rescinded. Students will not receive an orientation date until their confirmation fee is received.

Updating an Application—Students who apply and are not admitted but wish to be considered for a later semester must contact the University's Office of Admissions (612/625-2008) before admissions are closed and request that their application be updated.

Updating an Offer of Admission—Admission is valid only for the semester for which a student is admitted. If the student does not attend classes that semester and wishes to be considered for a later semester, they must request (before admissions are closed for the later semester) that their admission status be updated. If admission standards have changed in the meantime, the request will be reviewed according to the new requirements.

Appeals—An applicant may appeal an admission decision. Appeals must be in writing and sent to Director of Admissions, Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455-0213.

Admission Assistance—The GC Student Information Center can provide further assistance with

- checking the status of an admission application.
- answering parents' questions.
- answering high school counselors' questions.
- meeting with parents and counselors for preadmission conferences.
- arranging for on-site visits to the college and tours of the campus.
- arranging for sitting in on classes and meeting with faculty.

Call (612) 625-3339 (voice) or (612) 626-1014 (TTY).

New Student Orientation

All new students who enroll in GC's day program or plan joint day/UC enrollment must attend a two-day orientation/registration program before their first semester of registration.

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.

On the second day of orientation, GC faculty, advisers, and other academic professionals help students, individually and in groups, review these materials, interpret placement assessments, and plan their first semester's schedule. GC staff members also teach students how to register for classes using computerized self-registration.

Optional early information sessions in June introduce students to University resources and help them accurately assess their skills and motivation. First-generation, underprepared, and other nontraditional students are especially encouraged to take advantage of this program. For more information, students should contact the Student Information Center (612/625-3339 or gcinfo@umn.tc.edu).

Math Placement Assessment—All students admitted to GC must take a math placement assessment before they can attend orientation and register for classes. 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, GC math courses, or college-level math courses, contact the Student Information Center (612/625-3339 or gcinfo@umn.tc.edu).

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. Accordingly, GC allocates a significant proportion of its resources to provide a supportive learning environment for students in a program called the Base Curriculum. The Base Curriculum is for entering students whose academic preparation may not meet expected standards for University degree-granting programs. During their first year, students are expected to complete the program, which includes courses in writing, mathematics, natural

sciences, social sciences, and humanities. 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 means for improvement.

Transition Curriculum

Students who have completed the Base Curriculum may register for courses in the Transition Curriculum, which is characterized by more traditional coursework and by the expectation that students possess and can apply increasingly complex academic skills and that they need decreased levels of institutional support.

Policies

Registration Procedures—Students must file a preregistration agreement with their adviser each semester. After filing a registration agreement with an adviser, a student must fulfill that agreement and make sure that their registration is accurate, class hours do not conflict, course prerequisites have been met, and current courses are not equivalent to those already completed.

GC Registration Policies—Students are expected to

- complete the following Base Curriculum (BC) courses before applying for transfer to another University of Minnesota college:
 - mathematics (complete any unfulfilled University preparation requirements).
 - one BC course in science.
 - one BC course in social sciences.
 - one BC course in humanities.
 - freshman composition (completion of GC 1421 and GC 1422 or equivalent).
- complete a BC course in an area (science, social sciences, or humanities) before taking a course designated as Transition Curriculum or a non-GC course in that area.
- have an adviser approve registration plans each semester. Once all BC requirements are complete and an approved yearlong plan and transfer plan are on file, adviser approval is not required.
- register for at least one GC course every semester of residence in GC. Exceptions to this policy require adviser or college approval.

For additional information concerning registration procedures, see the *General College Student Workbook*.

Registering through UC—UC registration automatically appears on the day school transcript, and UC courses are reviewed for academic progress along with day school courses.

Holds—Registration holds restrict a student's registration until the unit or office that placed the hold either removes it or gives the student a temporary release. GC places holds on students' records when students

- do not have a completed transfer plan on file.
- must have adviser approval for registration.
- have accumulated excessive credits in the college.
- are suspended for lack of academic progress.
- are placed on probation.

Registration Changes—After the start of a semester, first-year students and students with GC registration holds must have their holds cleared by their advisers to make registration changes.

The Student Information Center provides General College students with information on admission, course registration, policies and procedures, and referrals to other services.

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 and are included internally in the GC review of academic progress, both for probation and Dean's List eligibility, even though they do not appear on the transcript cumulative GPA.

Monitoring Academic Performance—GC instructors use *Academic Alert* forms to report any problems their students are encountering. These reports are made to advisers for their follow-up with students to help resolve the problems. In addition, Base Curriculum course instructors evaluate and report on students' academic progress around the middle of each semester. Copies of the *Midsemester Academic Progress Review* go to the student and the student's adviser. Faculty also provide feedback to advisers about students who are not making satisfactory progress in mathematics or writing courses or who need to repeat courses.

Academic Standing—Students' academic achievement and progress toward transfer to another college are reviewed by GC at the end of each semester. GC students must earn a 2.00 GPA each term. In addition, they must maintain a cumulative GPA of 2.00. Grades in both day and UC courses are reviewed.

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, often a 2.50 GPA or higher.

Dean's List—Each academic semester, each student who has achieved an outstanding academic level is recognized by being named to the Dean's List. A letter of congratulation from the GC dean is sent to the student, and a notation is placed on the student's transcript. The Dean's List is posted each semester in the dean's display case on the first floor of Appleby Hall.

Academic Suspension—Students who continue to make unsatisfactory academic progress while on probation are suspended from GC. Such action is taken only after students have been provided the opportunity to get needed help with their academic difficulties and time to show improvement. Suspended students seeking readmission are reviewed by the GC Scholastic Standing Committee.

Progress Toward Transfer—At the end of their first year, students work with advisers to assess their progress toward transfer to a bachelor's degree program by completing a yearlong course plan and transfer plan. At that point, students whose records show a lack of progress toward transfer will receive counseling and may be encouraged to seek other educational options. Students will be assessed again during their second year. Students who do not make satisfactory progress toward transfer, as determined by adviser review at the transfer planning checkpoint (usually 30 credits), may receive a registration hold requiring additional planning under their adviser's direction.

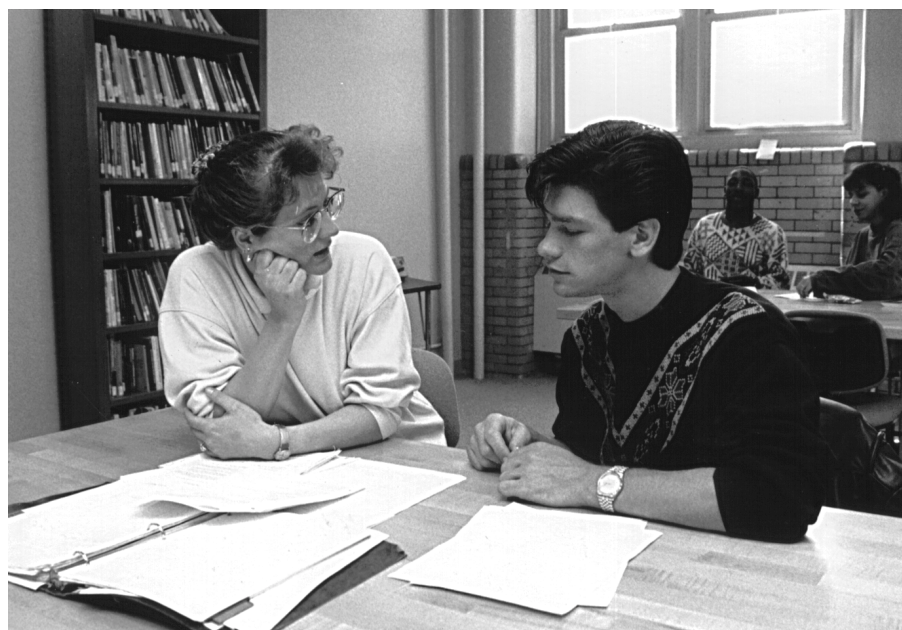
Excessive Credits—Because GC's mission is to prepare students for transfer, students are allowed to complete no more than 90 college-level credits in GC. Students who complete

90 credits but have not transferred will receive a registration hold prohibiting further registration in GC. Exceptions to this restriction are made on the basis of individual review by the GC Scholastic Standing Committee, usually requiring an agreement in writing between the student and the proposed transfer college.

Transfer Requirements—Each college and major at the University may have different GPA and credit requirements for transfer. Consult the appropriate college section of this catalog, an adviser, or the Transfer and Career Center, 127 Appleby Hall (612/624-4346), for the most current transfer information for specific colleges or majors.

Transfer to Other Colleges Within the University—It is strongly recommended that students complete at least three courses outside of GC, preferably in the area in which they intend to major, with at least a C average (2.00) for these courses. Transfer guides for some University colleges and more detailed information about transfer are available in the Transfer and Career Center, 127 Appleby Hall. Students should also make early contact with the college to which they wish to transfer. To begin the official transfer process, students should make an appointment for an interview with a GC student services adviser, 25 Appleby Hall, early in the semester preceding the one in which they wish to transfer. An *Application for Change of Status or College* and application deadlines are available from the Transfer and Career Center or the University's Office of the Registrar, 200 Fraser Hall.

Transfer Outside the University—Procedures for transfer to colleges outside the University may be discussed with a GC adviser. Requirements vary, but community and four-year colleges usually accept most GC credits.



Advising

Each GC student is permanently assigned to an individual professional adviser. Students may meet one-to-one with their adviser or attend group advising meetings. When an assigned adviser is not available to answer quick questions, the Student Information Center, 25 Appleby Hall, will refer students to an “on call” adviser.

First-year students must have adviser approval for registration. They may prepare for registration by attending a preregistration group meeting or meeting with their individual adviser. Advisers will contact their students about scheduled group planning opportunities offered throughout the semester. Students in their third term of registration must complete a yearlong plan and indicate preliminary transfer and degree goals. (Transfer usually takes place at the beginning of or during the second year of enrollment.)

Special Learning Opportunities

Directed Study—Directed Study is self-defined learning. Students assume full responsibility for determining what they want to learn, setting goals, designing a course of study, and finding an appropriate faculty member to guide and monitor the project. To arrange for Directed Study, students must file a contract form that has been worked out in consultation with a faculty mentor. Contract forms are available in 140 Appleby Hall. Credits earned in directed study do not usually transfer to other units in the University without special review or petition.

Commanding English—Commanding English is a yearlong, intensive combination of courses for GC students for whom English is a second language. All such students are required to report recent scores on the Michigan English Language Assessment Battery (MELAB) as part of the application process. Commanding English serves those students whose scores on this test range from 65 to 77. Students should allow enough time in the application process to complete any testing requirements. For application information, contact the GC Student Information Center, 25 Appleby Hall (612/625-3339); to sign up for the MELAB test, call the Asian Pacific American Learning Resource Center (612/624-2317).

Academic Resource Center (ARC)—ARC is a clearinghouse for GC tutorial services in math, writing, and other subject areas. The ARC has both Macintosh and IBM compatible computers and provides training for e-mail, word processing, and other computer applications. The ARC also provides math placement assessment for GC math courses.

- The Math Center (9 Appleby Hall) provides walk-in assistance to students for math and for science-related courses which also use math.
- The Writing Center (17 Appleby Hall) helps students with writing at any stage of completion through one-to-one consultation and electronic consultation at writers@tc.umn.edu.

No appointment is necessary to use ARC. Simply stop by 11 Appleby Hall or call (612) 626-1328.

Student Support Services (SSS)/TRIO Program—The SSS/TRIO Program is a multidimensional program that each fall targets between 100 and 120 new students to engage in intensive advising and counseling, group and individual tutoring, academic planning, and career exploration. To be eligible for SSS/TRIO, a student 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 guidelines, or (3) have a physical or learning disability. For more information, students should contact the SSS/TRIO Program, 40 Appleby Hall, 128 Pleasant Street S.E., Minneapolis, MN 55455 (612/625-0772).

Upward Bound—Upward Bound is a TRIO program that 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 residential term, Upward Bound students participate in a program of tutoring and academic coursework. Upward Bound is housed in 40 Appleby Hall (612/625-0772).

Ronald E. McNair Program—Ronald E. McNair Program prepares low-income, first-generation college students for graduate study. Services include academic counseling, tutoring, Graduate Record Examination test preparation, paid research internships, mentoring, Graduate School application assistance and advocacy, and seminars to help participants prepare for Graduate School. Applications are available in 40 Appleby Hall, or students may call (612) 625-0772 to make an appointment with an adviser.

Student Parent HELP Center—Student Parent HELP Center is a program to help low-income undergraduate student parents find funding for their child care costs. The center also answers questions regarding educational and academic goals and makes referrals to community programs that can help with family needs. Enrichment and support opportunities include weekly student parent peer support meetings. The HELP Extension Grant Program provides eligible student parents with grants for University College course tuition and book costs. The HELP Center also has a student parent study room, 133 Appleby Hall, and meeting room, 135 Appleby Hall. Both are equipped with computers, telephone, typewriter, refrigerator, and microwave.

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 in 25 Appleby Hall (612/625-3339) serves as a quick source for help in matters that do not require a meeting with an adviser. Staff also schedule appointments with advisers and provide referrals.

Twenty-eight General College faculty have been honored as recipients of the Morse-Alumni Association Award for Outstanding Contributions to Undergraduate Education.

International Programs

GC strongly encourages students to consider overseas study experiences. Study abroad can strengthen an application for transfer to another college, help prepare a student for a multicultural workplace within a global economy, and contribute greatly to the student's knowledge of the world, their self-confidence, and their understanding of their own culture. Students can earn full credit toward a degree while overseas and can usually apply their financial aid. To explore the options, students should make an appointment with a study abroad options adviser in the Global Campus, 102 Nicholson Hall (612/626-9000).

Career Information

The GC Transfer and Career Center, 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.
- decision making and career development.
- choosing a major and a college for transfer.
- increasing motivation.
- solving personal problems and dealing with interpersonal stress.

30-80 Credit Check-in, Transfer Planning—

- preparing a transfer plan.
- transfer deadlines and applications.
- making appointments with visiting adviser liaisons.
- referrals to University of Minnesota transfer specialists.

Resources to Help Students in Their Career Search—

- career resource library.
- University of Minnesota "Majors Information" files.
- computerized career guidance programs.
- study abroad internship and scholarship information.
- workshops on goals, majors, and careers.
- transfer planning programs (Majors Information Week).

Student Organizations

The GC Student Board is a student government association that represents the student body. Student Board members are GC students who have a strong commitment to students and the future of the GC community. Membership on the Student Board is open to all GC students. Former GC students may be alumni members. For more information on becoming a Student Board member, stop by the Student Information Center, 25 Appleby Hall. The Student Board office is in 120 Appleby Hall (612/625-6004).

Directory

(area code 612)

Office of the Dean

109 Appleby Hall
625-6885
626-7848 (fax)

Academic Affairs and Curriculum

240 Appleby Hall
625-2880

Academic Service Center

140 Appleby Hall
626-8705
625-0709 (fax)

Commanding English Program

233B Appleby Hall
625-3514

Student Services

Academic Advising

25 Appleby Hall
625-3339

Academic Resource Center

11 Appleby Hall
626-1328

College Registrar

33 Appleby Hall
626-7141

Student Information Center

25 Appleby Hall
625-3339
625-0704 (fax)

Transfer and Career Center

127 Appleby Hall
624-4346

Student Board

120 Appleby Hall
625-6004

Technical Support Services

211 Appleby Hall
625-3413

Affiliated Programs

Student Parent HELP Center

180 Appleby Hall
625-5307

TRIO Programs

40 Appleby Hall
625-0772
(McNair Program, Student Support Services, TRIO Programs, Upward Bound)
625-0704 (fax)

University Day Community

101 27th Avenue S.E. #101
627-4107

GC on the Web

<www.gen.umn.edu>

College of Human Ecology

This is the College of Human Ecology section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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Abe Goldstein
A Museum of Art

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College of Human Ecology

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, except for the School of Social Work; it is located on the Minneapolis campus but will relocate to St. Paul during the 1999-2000 academic year. 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 taken-for-granted art closest to people's 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—Refer to the University of Minnesota-Twin Cities undergraduate application booklet for freshman admission requirements.

Transfer Students—Complete high school preparation requirements (if post-1986 high school graduate), including one year each of algebra, geometry, and intermediate algebra. Complete high school intermediate algebra or equivalent regardless of high school graduation date. 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 "Admissions" in the General Information section, or see "Degree Programs" in CHE for major-specific admission requirements.

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.

Honors

The lower division honors program provides freshmen and sophomores with advanced learning opportunities through more intensive interaction with faculty and other high-ability students. Lower division honors students complete two honors options and the First Year Honors Colloquium and receive a certificate of completion at the annual CHE honors and awards program.

The upper division honors program offers juniors and seniors (60+ credits) 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

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.

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).

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.

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 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) and an exchange program with DeMontfort University in Leicester, England sponsored by the Department of Design, Housing, and Apparel. (See also "Special Learning Opportunities" in the General Information section.)

Advising

Upon being admitted to CHE, students are assigned an academic adviser, usually during New Student Orientation.

Design, Housing, and Apparel Students—For adviser information or to make an appointment, students should call (612) 674-9700 (including pre-clothing design, pre-graphic design, pre-interior design, clothing design, graphic design, interior design, housing studies, retail merchandising).

Family Social Science Students—For adviser information or to make an appointment, students should call (612) 625-2252 or 625-1282.

Food Science and Nutrition Students—For adviser information or to make an appointment, students should call (612) 624-6753.

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, classes, and workshops, and maintains a Career Resource Library to help students clarify career goals, secure internships, explore overseas study/travel, and plan for a proactive job search. Staff members teach career planning courses and 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. Some CHE programs require students to participate in a preplanned internship experience and other programs strongly encourage it. Internship credits vary, depending on program area. The Career Services Center acts as a clearinghouse for internship information.

For questions concerning career planning, internships, and job opportunities, call the Career Services Center (612/624-6762).

Student Organizations

Human Ecology Ambassador Student Board (HESAB)—HESAB is an all college organization created to promote, initiate, and coordinate student organization activities; welcome new students; and serve as a liaison between students and faculty in achieving college goals.

College of Human Ecology

General Information

Clothing Design

Family Social Science

HESAB sponsors and organizes the Human Ecology Student Hospitality Room during freshman orientation. HESAB has representation in 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

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.

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

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
400 Ford Hall
624-5888

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.

The clothing design program develops students' 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, successfully completing DHA 1221, or successfully completing an approved clothing construction course.
- 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

To complete the degree, 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 1101—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—Aesthetics of Clothing (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—Quality Assurance: 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 (3 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.



Family Social
Science

Food Science

Graphic Design

Housing Studies

According to the
1996 Gourman
Report, the College of
Human Ecology ranks
#2 in the nation
among colleges with
similar programs.

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 other allied health disciplines.

Admission Requirements—The program admits freshmen and transfer students.

Degree Requirements

To complete the degree, 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, 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 (3 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 (2 cr) (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

Seven courses/21 cr of 3xxx and 4xxx 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 design a research-oriented skills application area with higher level mathematics, statistics, and research experiences. An academic plan for the applied area of study must be approved by the program chair.

Final Project

Students are required to participate in a community internship that is consonant with their program and career goals. Students who are considering graduate school are strongly encouraged to participate in a faculty-directed research internship that augments their research-oriented skills.

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

To complete the degree, students must complete at least 120 credits, including 91 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 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 (3 cr)

Stat 3011—Introduction to Statistical Analysis (4 cr)

Pick one of the following lab courses: BioC 4025, Chem 2111, Chem 2311, FScN 4612

Pick one of the following microbiology courses: MicB 2032, MicB 3301, VPB 2032

Pick 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—Principles of Food Engineering (4 cr)

FScN 4332—Food Processing Operations (3 cr)

One of the following courses with a Capstone component: FScN 4341, FScN 4342, FScN 4343, FScN 4344

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 the final semester.

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 1101, 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

To complete the degree, 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 completed with a grade of at least 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 1101—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 2385—Design and Factors of Human Perception (4 cr)

DHA 3312—Color and Form in Surface Design (3 cr)

DHA 3352—Graphic Design II: Identity and Symbols (3 cr)

DHA 3353—Graphic Design III: Packaging and Display (3 cr)

DHA 4131—History of Visual Communication (4 cr)

DHA 4196—Internship in DHA (1-2 cr)

DHA 4334—Computer Applications II: Design for the Digital Environment (3 cr)

DHA 4345—Advanced Typographic Design (4 cr)

DHA 4350—Design Process: Materials (3 cr)

DHA 4354—Graphic Design IV: Integrative Campaign (4 cr)

DHA 4355—Graphic Design Portfolio (2 cr)

DHA 4365—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 (3 cr)

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 broad 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

To complete the degree, 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 1101—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 World Perspective (3 cr)

or DHA 5484—Rural Housing Issues (3 cr)

DHA 5463—Housing Policy (3 cr)

DHA 5467—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)



Housing Studies

Interior Design

Nutrition

Rhet 3562—Technical and Professional Writing (3 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 3361, Geog 3371, Geog 3605, Geog 5372, PA 5211
One statistics course from BA 1550, EPsy 3264, GC 1454, 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 3311, ApEc 5581, Arch 5645, DHA 4482, DHA 5481, DHA 5484, Econ 4623, FSoS 4103, Geog 3361, Geog 3371, Geog 3373, Geog 3605, Geog 5361, Geog 5371, Geog 5372 (PA 5202), Geog 5724, PA 5002, PA 5004, PA 5013, PA 5211, PA 5212, Pol 1001, Rhet 4573, Rhet 52258, Soc 1001, Soc 3201, Soc 3211, Soc 3451, UrbS 1001, UrbS 3001, UrbS 3301, 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 4101, DHA 1601, DHA 1602, DHA 2612, DHA 2613, DHA 2621, DHA 4482, DHA 5481, Geog 5724, PubH 5110, PubH 5120, 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, Fina 3001, Fina 4241, BLaw 3058, DHA 4482, DHA 5481, Econ 3701, Econ 3801, Econ 4623, 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:

- The elderly: DHA 5481, DHA 5484, FSoS 4154, Gero 5105, Kin 5385, PA 5412, Psy 5138, PubH 3001, PubH 5932, Rec 5241, Rhet 4573, Rhet 5258, SW 2001, SW 5313, WoSt 4201
- Low income, minority, and single-parent populations: DHA 5484, FSoS 3101, FSoS 3102, FSoS 3103, FSoS 3426, FSoS 4102, FSoS 4153, FSoS 4156, Geog 3375, Geog 5371, PA 3311, PA 5401, PA 5421, Pol 1001, PubH 3001, PubH 3003, Rhet 4573, Rhet 5258, Soc 1001, Soc 3201, Soc 3211, Soc 3251, Soc 3451, 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 1101, 1311, 1312, 1601, and 1602. Maintain overall GPA of at least 2.50. Receive positive assessment of design work through portfolio review.

The interior design program is the only four-year accredited interior design program in Minnesota.

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 1101—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 4607—Interior Design Studio VII (4 cr)
DHA 4608—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 (3 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 4196—Internship in DHA (1 cr)
DHA 4330—Surface Fabric Design Workshop (4 cr)
or DHA 4340—Woven 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.

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

To complete the degree, 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.

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 4612—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 (3 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, 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 on page 117, 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 (2 cr)
 FScN 4596—Field Experience in 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 (4 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—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

To complete the degree, 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)
 ApEc/Econ 1101—Principles of Microeconomics (3-4 cr)
 ApEc/Econ 1102—Principles of Macroeconomics (3-4 cr)
 BA 1550—Business Statistics: Data Sources, Presentation, and Analysis (4 cr)
 BIE 5626—Customer Service Training (3 cr)
 or BIE 5624—Sales Training (3 cr)
 DHA 1101—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 3241—Retail Buying (3 cr)
 DHA 3243—Visual Merchandising (3 cr)
 DHA 3245—Nonstore Retailing (3 cr)
 DHA 4196—Internship in DHA (3 cr)
 DHA 4212—Dress, Society, and Culture (4 cr)
 DHA 4217—International Developments in Textiles and Apparel (4 cr)
 DHA 4241—Retail Promotion (3 cr)
 DHA 5216—Textile and Apparel Consumer (3 cr)
 HRIR 3021—Human Resource Management and Industrial Relations (4 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)
 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 (3 cr)

Final Project

An internship is to be completed before the last semester of the student's program.

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*The Frederick R. Weisman Art Museum
Opening in Late November*

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 or the College of Biological Sciences. (See the list of majors on page 123 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 14,200 undergraduate students and about 1,600 graduate students were enrolled in CLA programs in fall 1998. The college is staffed by 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 help direct students to the many learning opportunities available within CLA and throughout the University and the Twin Cities.

The degree requirements established by the college give students an education solidly based in the liberal arts. Courses that meet the Twin Cities campus-wide liberal education requirements will introduce students to modes of inquiry and subject matter characteristic of the major branches of knowledge, as well as four themes of particular contemporary relevance: international perspectives, cultural diversity, environmental issues, and citizenship and public ethics. In recognition of the importance of communication and the ability to write, students take several writing courses, including a formal first-year composition or rhetoric course and upper level intensive writing courses. The CLA language requirement helps students become proficient in a second language.

A liberal education means not only a breadth of knowledge, but depth and proficiency in a single field of knowledge. Students select a major field and, as part of the study of that discipline, prepare a major project, usually a paper.

Admission

Prospective Student Services

Preadmission advising and assistance are offered by the University 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 freshmen. 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

New Freshman and Freshman Transfer Admission

High school graduates with no previous college work enter as new freshmen. High school graduates who have completed less than one year of college work (fewer than 39 quarter or 26 semester credits) also enter as freshmen. 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 1997, 82 percent of CLA freshmen had high school rank percentiles of 70 or higher. The mean high school rank was 80 percent. The mean ACT composite score was 24.6. The mean SAT verbal score was 589 and mean SAT math score was 586. Applicants are not guaranteed admission even if they match or exceed some or all of these score levels.

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>).

Adult Special/Postbaccalaureate Admission

If students are interested in enrolling in CLA courses but not in earning a CLA degree, they may wish to consider enrollment opportunities available through University College, 101 Westbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612/625-3333).

Advising services for CLA adult special 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, 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.

The median high
school rank for new
CLA honors students
is in the 96th
percentile.

CLA offers major and minor programs in the following subjects.

African and Afro-American studies	European area studies	Music
American Indian studies	Film studies	Music education (major only)
American studies	French	Music therapy (major only)
Ancient Near Eastern studies (major only)	French and Italian (major only)	Philosophy
Anthropology	Geography	Physics
Architecture	Geology and geophysics	Physiology (major only)
Art (major only)	German	Political science
Art history	Greek	Psychology
Astronomy	Hebrew	Religious studies
Biology	History	Russian
Chemistry	Individualized studies (major only)	Russian area studies
Chicano studies	Interdepartmental major (major only)	Scandinavian languages and Finnish
Child psychology	International relations (major only)	Sociology
Chinese	Italian	South Asian and Middle Eastern area studies
Classical civilization	Japanese	Spanish
Computer science	Jewish studies	Spanish and Portuguese
Cultural studies and comparative literature	Journalism	Speech-communication
Dance	Latin	Speech and hearing science
East Asian studies	Latin American studies	Statistics
Economics	Linguistics	Theatre arts
English	Mathematics	Urban studies
	Microbiology (major only)	Women's studies

CLA offers additional minor programs in the following subjects.

Biblical studies
Dutch
Environmental geosciences
Foreign studies
History of medicine
History of science and technology
Humanities in the West

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. Individual major programs may be modified by the department or students' major adviser. 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 them satisfy general education requirements. See individual program listings for required preparatory courses.

Major Project—CLA requires that students complete a major project. The project demonstrates analytic and conceptual skills as well as an understanding of the mode of inquiry characteristic of the discipline. For most majors, the format of the project is a paper.

Outside-of-Major Requirement—B.A. programs must include at least 18 3xxx, 4xxx, and 5xxx credits outside the major department. Heavy concentration in a major field that limits breadth of learning may defeat the basic purpose of a liberal education, which encompasses breadth as well as depth of knowledge. Established and individualized interdepartmental majors listed below are exempt from this requirement.

Established Interdepartmental Majors—These majors are offered in African studies, American studies, classical civilization, East Asian studies, European studies, international relations, Jewish studies, Latin American studies, South Asian and Middle Eastern area studies, Russian area studies, urban studies, and women's 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 of 50 credits that 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 more coursework 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.

Double Major—Students may earn a double major by completing background and major requirements for two areas of concentration in addition to other degree requirements. They should usually declare a double-major program by the beginning of their senior year but should start completing basic requirements earlier. If students have a double major, they need not meet the B.A. requirement of 18 3xxx, 4xxx, and 5xxx credits outside the major. Students pursuing a double major are urged to consult with both departments about a possible joint major project.

CLA students can
take advantage of
over 1,300 different
internship programs
through the Office
for Special Learning
Opportunities
(OSLO).

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, for summa cum laude, an honors thesis. Some departments also require honors theses for cum laude and magna cum laude degrees. Students must complete the honors requirements for their degree within two years of the semester in which they apply for graduation.

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 the word “Honors” in the course title.

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 90 quarter or 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 90 quarter or 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 90 quarter or 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.

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.

Second language credit may be earned by completing a higher-level first- or second-year skills course with a grade of at least C- and requesting that credit be posted from previous courses. If students received college credit for equivalent language skills courses at another institution, they may not receive retroactive credit for this. Students should consult their college office about testing for credit.

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.

Leaving College—To leave the University during a semester, students must cancel all courses for which they are registered. Complete ("exit") cancellation can be processed through the last day of classes (or through study day, if it is a weekday). CLA students who plan to withdraw from all courses for a semester or not register for a subsequent semester, whether to leave the college permanently or take a temporary leave of absence, must submit to their college office a *Leave of Absence* form. Students who withdraw without receiving an approved leave of absence may be required to reapply for admission. Information about these procedures is available in college advising offices and the CLA Student Information Office, 49 Johnston Hall (612/625-2020).

Reentry After an Absence—Students who wish to return after an absence should contact the CLA Student Information Office, 49 Johnston Hall, for information at least 12 weeks before the term they wish to return. Students in good academic standing may return freely within the terms of an approved leave of absence. Students without an approved leave of absence may be required to reapply for admission to the college.

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. All credits earned with grades of A, B, or C and a restricted number earned with grades of S or D are acceptable.

To earn a CLA degree, students must earn at least 30 credits from CLA departments. At least half of the CLA credits applied toward the degree (never fewer than 30) 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.

Degree Requirements After an Absence—If students have not attended CLA for more than two years, they 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.

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 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. Eligible students who complete a Twin Cities campus language sequence course with a grade of C- may request to have credits for preceding courses in the sequence posted retroactively if they have not already received college credit for equivalent courses at another institution.

Students planning on the B.A. degree should study a language for three years in high school.

CLA Entrance Requirement—All B.A., 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., 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. First-year students are expected to meet with their adviser each semester. After choosing a major and attaining sophomore standing, students are assigned two advisers: one in their major department (whom they usually retain until graduation); and one in their college office who has access to their college records, which move with students from their premajor college office to the appropriate upper division college office.

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 college office; this office provides advising services and procedural information. The offices are:

Premajor Advising—For first-year, preprofessional, and continuing students who have not declared majors; <www.cla.umn.edu/advising/premajor.htm>

105 Johnston Hall (612/624-9077)—premajor advising coordinator

30 Johnston Hall (612/624-9006)—mathematics and biological and physical science premajors; preprofessional students interested in health sciences and engineering; students exploring health sciences, applied sciences, and technology

B-18 Johnston Hall (612/624-9585)—social sciences, humanities, and fine arts premajors; preprofessional students interested in management and education; students exploring social sciences, humanities, and fine arts majors

Upper Division Advising—For sophomores, juniors, and seniors who have chosen majors, and designated special programs; <www.cla.umn.edu/advising/advising_offices/ud_adv/ud_home.htm>

East Bank majors—114 Johnston Hall (612/624-4545)

West Bank majors—122 Social Sciences Building (612/624-5848)

Advising for Special Programs

Adult Special: Nondegree Students—114 Johnston Hall (612/624-4545) <www.cla.umn.edu/advising/new_st/ad_spec_adv.htm>

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 administers various other programs such as the National Student Exchange, two programs of the Higher Education Consortium for Urban Affairs (HECUA), and 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.

Community Involvement Programs—Many students participate in community involvement programs that focus on youth tutoring, English-as-a-second-language tutoring, housing issues, and a variety of other community concerns. These programs offer students the opportunity to gain valuable experience (with the option of earning college credit) while helping to make a difference in the community. For example, Project ADAPT (Appreciating Differences Among People and Things) allows students to earn credit while sharing their intercultural experiences with public school children.

One-third of CLA's programs rank in the top 20 in the nation.

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 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 and earn a semester GPA of at least 3.67.

To be recognized as a *CLA Scholar*, students must complete at least 15 credits and earn a semester GPA of at least 3.75 with no N grades.

University College registrations are included in assigning these honors. If students believe they qualify for either list but are not included, they should consult the staff in 106 Johnston Hall (612/625-3824).

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 Global Campus (102 Nicholson 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 on-

line 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

—320 Walter Library, 612/626-0348,
clasb@tc.umn.edu, <www.tc.umn.edu/nlhome/g159/clasb/>

The College of Liberal Arts Student Board (CLA-SB) is the college’s student governance body. The board is the official channel through which recommendations from the CLA student body are brought to the college.

CLA-SB also represents students with seats on many committees and deals with nomination or election of students to seats on many others. These governing councils and committees collectively deal with virtually all aspects of CLA policy.

One primary responsibility of CLA-SB is to maintain contact with department student organizations.

All students are encouraged to participate in the operations of the board and to contribute to decisions affecting the college. The board is composed of elected and appointed members. The board recognizes and practices affirmative action.



Directory

(area code 612)

Department of Afro-American and African Studies

808 Social Sciences Building
Ronald McCurdy, chair 624-9847

Department of American Indian Studies

107 Scott Hall
Patricia Albers, chair 624-1338

Program in American Studies

104 Scott Hall
David Roediger, chair 624-4190

Department of Anthropology

395 Hubert H. Humphrey Center
Stephen Gudeman, chair 625-3400

Interdisciplinary Archaeological Studies

395 Hubert H. Humphrey Center
Guy Gibbon, director 625-1062

Department of Art

208 Art Building
Mark Pharis, chair 625-8096

Department of Art History

107 Jones Hall
Frederick Asher, chair 624-4500

Center for Austrian Studies

314 Social Sciences Building
Richard Rudolph, director 624-9811

Department of Chicano Studies

107 Scott Hall
Guillermo Rojas, chair 624-6309

Classical Civilization Program

300 Folwell Hall
Thomas Clayton, chair 625-7565

Department of Classical and Near Eastern Studies

330 Folwell Hall
William Malandra, chair 625-5353

Center for Cognitive Sciences

205 Elliott Hall
Paul van den Broek, director 625-9367

Department of Communication Disorders

115 Shevlin Hall
Charles Speaks, chair 624-3322

Department of Cultural Studies and Comparative Literature

350 Folwell Hall
Richard Leppert, chair 624-8099

Center for Early Modern History

715 Social Sciences Building
James Tracy, director 624-0808

Department of Economics

1035 Management and Economics
V. V. Chari, chair 625-6353

Department of English

207 Lind Hall
Shirley Garner, chair 625-3363

Minnesota English Center

101 Klaeber Court
Lynne Ackerberg, director 624-1503

Center for Advanced Feminist Studies

496 Ford Hall
Sally Kohlstedt, director 624-6310

Department of French and Italian

260 Folwell Hall
Mária Brewer, chair 624-4308

Department of Geography

414 Social Sciences Building
Richard Skaggs, chair 625-6080

Department of German, Scandinavian, and Dutch

205 Folwell Hall
James Parente, chair 625-2080

Institute for Global Studies

214 Social Sciences Building
Gloria Raheja, director 624-9007

Area Studies Programs

214 Social Sciences Building
Edward L. Farmer, director 626-1821

Center for German and European Studies

309 Social Sciences Building
Jack Zipes, director 625-1557

Modern Greek Studies

325 Social Sciences Building
Theofanis Stavrou, director 624-4526

International Relations Program

214 Social Sciences Building
Russell Moses, director 624-7346

Department of History

614 Social Sciences Building
Kinley Brauer, chair 624-2800

Center for Holocaust and Genocide Studies

113 Folwell Hall
Stephen Feinstein, director 626-2235

Humanities Institute

106B Jones Hall
Daniel Brewer, director 624-7032

Humanities Program

832 Management & Economics
George Kliger, coordinator 625-6365

Immigration History Research Center

826 Berry Street, St. Paul
Rudolph Vecoli, director 627-4208

Individualized Degree Programs

345 Fraser Hall
Karen Murray, coordinator 624-8006

Dworsky Center for Jewish Studies

330 Folwell Hall
Jonathan Paradise, director 625-5353

School of Journalism and Mass Communication

295 Hubert H. Humphrey Center
Albert Tims, director 625-9824

China Times Center for Media and Social Studies

612 Management & Economics
C. C. Lee, director 626-7446

Minnesota Journalism Center

295 Hubert H. Humphrey Center
Kathleen Hansen, director 625-8095

Silha Center for Study of Media Ethics and Law

645 Management & Economics
William Babcock, director 625-3421

Center for Advanced Research on Language Acquisition

1313 5th Street S.E., Minneapolis
Elaine Tarone, director 627-1870

Language Center

51 Folwell Hall
Jenise Rowekamp, coordinator 624-6811

Institute of Linguistics and Asian and Slavic Languages and Literatures

192 Klaeber Court
Gerhard Weiss, chair 624-3331

MacArthur Interdisciplinary Program on Peace and International Cooperation

260 Social Sciences Building
Allen Isaacman, director 624-0832

Center for Medieval Studies

304 Walter Library
Oliver Nicholson, director 626-0805

School of Music

200 Ferguson Hall
Everett Sutton, director 624-5093

Department of Philosophy
382 Management & Economics
Douglas Lewis, chair 625-6563

Minnesota Center for Philosophy of Science

746 Management & Economics
Kenneth Waters, director 625-6635

Center for Political Psychology

1282 Social Sciences Building
Eugene Borgida and John Sullivan,
codirectors 624-0864

Department of Political Science

1414 Social Sciences Building
John Freeman, chair 624-4144

Department of Psychology

N218 Elliott Hall
Eugene Borgida, chair 625-2818

Religious Studies Program

330 Folwell Hall
William Malandra, chair 625-5353

Social Science Research Facility

25 Blegen Hall
John Easton, manager 625-8556

Department of Sociology

909 Social Sciences Building
Candace Kruttschnitt, chair 624-4300

Life Course Center

1014 Social Sciences Building
Jeylan Mortimer, director 624-6333

Department of Spanish and Portuguese

34 Folwell Hall
Carol Klee, chair 625-5858

Department of Speech-Communication

460 Folwell Hall
624-5800

School of Statistics

270a Vincent Hall
Seymour Geisser, director 625-8046

Applied Statistics

352 Classroom-Office Building
Douglas Hawkins, chair 625-7030

Statistical Center

352 Classroom-Office Building
Sanford Weisberg, director 625-8777

Statistical Clinic

133 Classroom-office Building
Sanford Weisberg, director 625-3121

Theoretical Statistics

270A Vincent Hall
James Dickey, chair 625-7300

Department of Theatre Arts and Dance

580 Rarig Center
Lance Brockman, chair 625-3077

Dance Program

Barbara Borker Dancer Center
Marge Maddux, head 624-5060

University Theatre

110 Rarig Center
Sherry Wagner, managing director
625-5380

Urban Studies Program

348 Social Sciences Building
Judith Martin, director 626-1626

Department of Women's Studies

108 Jones Hall
Jacquelyn Zita, chair 624-6006

Center for Interdisciplinary Studies of Writing

227 Lind Hall
Lillian Bridwell-Bowles, director 626-7579

Student Board

320 Walter Library 626-0348

CLA offers more than
60 majors and
preparation for 16
professional 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.

Admission Requirements—Depending on their chosen track, all students complete Afro 1011—Introduction to Afro-American Studies or Afro 1021—Introduction to Africa.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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 or from courses taken S-N. 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.

Admission Requirements—Students take AmIn 1001—Introduction to American Indian Studies.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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.

Admission Requirements—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.

Admission Requirements—Students intending to major in ancient Near Eastern studies are required to complete Afro 3102—Intermediate Arabic II or Hebr 3012—Intermediate Hebrew II with a grade of B or better.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including at least 31 credits in the major in the areas of anthropology, archaeology, art history, linguistics, literature, and a Near Eastern language and complete a major project.

Required Courses

Language (two courses from one of the following)

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

ArH 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 (ANE 3951) is required. 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.

Admission Requirements—Students must have completed both Anth 1001—Human Origins and Anth 1003—Understanding Cultures with a C- or better.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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.**

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 and an individualized elective concentration or minor planned by the student with the assistance of an adviser.

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 60 credits. Students are admitted to the major based on space availability and academic record (a minimum GPA of 2.50 is required overall and in all architecture courses taken).

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” on page 132, and liberal education requirements totaling a minimum of 60 credits (may include current enrollment).



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*.

2. Meet with their CLA adviser to complete the Pre-Architecture Planning Sheet. (Premajor Advising, 30 Johnston Hall, 624-9006; Martin Luther King Program (MLK), 19 Johnston Hall, 625-2300; CLA Honors Program, 115 Johnston Hall, 624-5522)
3. Meet with the Department of Architecture undergraduate adviser, 110 Architecture, 624-7866. 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

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 40 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 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.

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)

Required General Education Courses (13 cr)

EngC 1011—University Writing and Critical Reading (4 cr)

Math 1142—Short Calculus (3 cr)

or Math 1271—Calculus I (4 cr)

Phys 1201—General Physics I (5 cr)

Architecture Major Requirements (28 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)

Technology

Arch 5501—Environmental and Material Forces in Architecture (4 cr)

Electives

Arch 5xxx—Student's choice within area of interest (3–9 cr)

Elective Concentration or Minor (18 credit minimum)

B.A. 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 design. 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 adviser. The concentration or minor must be clearly presented at the time of the application to the major as it

becomes an integral part of the Major Program Form. As individual goals change, the approved concentration may be revised by department consultation and a written amendment to the Major Program Form. These credits count toward the CLA requirement of courses outside the major.

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

This status is a competitive opportunity for qualified undergraduates to complete the B.A. and M.Arch. in six years rather than seven. Applicants for the accelerated status must complete all B.A. degree requirements before their senior year, with the exception of no more than two courses in either the elective concentration or minor, or in general education requirements. In this program students complete the first year of the graduate professional degree program in their senior year; courses carry upper division credit. Summer and University College are acceptable methods to complete the B.A. degree requirements. Admission to the 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.A. in architecture major, have completed one year of architecture design studio (Arch 5281, 5282), have completed 90 credits, have an overall GPA of 3.25 or above, and be highly recommended by two design studio instructors.

Nonmajors, students with B.A. or B.S. degrees in disciplines other than architecture who are 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 10 x 12) containing representative works—a range of exercises from architecture drawing classes, several architecture design projects from each studio completed, and their best work from any studio arts classes;
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 will be notified by July 1. A written acceptance must be returned to the department within fourteen days after notification or the status will be revoked and reassigned to another qualified candidate. If accepted to the accelerated status, students must commence the first year of the professional curriculum the following fall semester (there is no deferral).

Students in the accelerated program enroll in the following courses their senior year:

First Semester (16 cr)

Arch 5291—Undergraduate Architecture Studio III (6 cr)
Arch 5371—Computer Methods I (1 cr)
Arch 5411—Principles of Design Theory (3 cr)
Arch 5511—Construction Materials in Architecture (3 cr)
Arch 5513—Environmental Technology I: Thermal Design in Architecture (3 cr)

Second Semester (16 cr)

Arch 5292—Undergraduate Architecture Studio IV (6 cr)
Arch 5372—Computer Methods II (1 cr)
Arch 542x—Pre-Modern History Elective (3 cr)
Arch 5512—Building Methods in Architecture (3 cr)
Arch 5571—Architectural Structures I: Wood and Steel Design (3 cr)

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 and grade point average in the major. The B.F.A. is oriented toward professional practice or admission to a master's degree program.

B.A.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including at least 38 credits in the major.

Art majors complete four core (1xxx) courses, at 4 credits each, including an introductory course in visual arts, a course in two-dimensional expression, a course in three-dimensional concepts, and a course in a reproducible media.

Major coursework requires a minimum of 15 credits (usually five 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.



Art

Art History

Astronomy

Biblical Studies

Biology

More than 70 CLA
faculty members
have received awards
for outstanding or
distinguished
teaching.

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 and showing evidence of a B average in all major coursework. 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 an 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
30 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.

Art History

Department of Art History

B.A.

The program helps students develop an awareness of the visual environment through historical examination of architecture, sculpture, painting, and other visual art forms.

All 1xxx level courses and most 3xxx courses are for general audiences. For advanced work in art history, the department offers professionally oriented courses leading to a B.A. degree.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including at least 34 credits in the major.

Students take 3 credits in art practice (consult the director of undergraduate studies). The CLA second language requirement satisfies the department's language study requirement. All students complete a major project. All major courses must be taken A-F.

Students who intend to apply for graduate study are strongly encouraged to take 5xxx courses and courses that cover a wide chronological-geographical span.

Required Courses

Five of the following specifically designated courses: ArtH 3005, 3008, 3009, 3011, 3012, 3013, 3014, 3015, 3921

14 cr in additional art history courses of which at least 6 cr must be at the 5xxx level.

Art practice—3 cr (consult the director of undergraduate studies).

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 that may be applied toward the major are currently cross-listed.

Final Project

Each student completes a major project consisting of: a) a preliminary research paper for either ArtH 3930 (a junior-senior seminar) or any 5xxx course (to be selected by agreement with the instructor); b) ArtH 3971—Major Project Research Paper. The major project course must be selected in consultation with the director of undergraduate studies.

Minor Requirements

The art history minor consists of three courses selected from the following: ArtH 3005, 3008, 3009, 3011, 3012, 3013, 3014, 3015, 3921; and two 5xxx art history lecture courses. The minor program must be approved by the director of undergraduate studies. Directed study, independent study, and S-N credits may not be applied toward the minor.

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.

Admission Requirements—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

For a minor in astronomy, students take 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, comparative religion and other social sciences, 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.

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, and train other students for careers in industry, education, or government.

Degree Requirements

To complete the degree, 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

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 Biol 1009, 1001, and 1002 must be at least C-.

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:

Biology

Chemistry

Chicano Studies

Child Psychology

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

The following courses must be taken A-F, unless the course is only offered S-N.

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

Note: Grades in Math 1271, Math 1272, Chem 1021, and Chem 1022 must be at least C-.

**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.*

Chemistry

Department of Chemistry

B.A.

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

To complete the B.A., students must complete at least 120 credits, 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

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 Lab (3 cr)

Chem 2101—Introductory Analytical Chemistry Lecture (3 cr)

Chem 2111—Introductory Analytical Chemistry Lab (2 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)

Advanced chemistry lab elective (4 cr) from Chem 4111, 4311, 4511, 4711

Advanced technical elective (3-4 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)

Biol xxxx—Biology, with lab that meets liberal education requirement (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. Students are encouraged to develop interests in other disciplines in order to pursue double majors.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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.

Through the JASON Project, the University's Bell Museum works directly with Titanic discoverer Dr. Robert Ballard on distance learning programs for young people.

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 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

For a minor, students complete Chic 1105 or Chic 1106; two courses in history from: Chic 3427, 3428, 3441, 3442; one course in literature: Chic 3507 or 3114; and 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.

Admission Requirements—Students take CPsy 2301—Introductory Child Psychology and Psy 1001—Introduction to Psychology in preparing for the major.

B.A.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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

Students take the required preparatory courses: CPsy 2301—Introductory Child Psychology and Psy 1001—Introduction to Psychology. To complete the minor, they take CPsy 3308—Introduction to Research Methods; one course (4 cr) from CPsy 4329, 4331, 4343; and 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 44 additional credits in the major. Major credits are distributed among core courses, a methods course, a senior project, and electives.

Required Courses

Methods Courses

CPsy 3308—Introduction to Research Methods

One of the following statistical methods courses: EPsy 3264, Psy 3801, Soc 3811, Stat 3011

One evaluation methods course: EPsy 5243—Principles and Methods of Evaluation or EPsy 5849—Observation and Assessment of the Preschool Child

Core Courses

CPsy 4311—Behavioral and Emotional Problems of Children

or CPsy 4313—Developmental Disabilities

CPsy 4329—Biological Foundations of Development

CPsy 4331—Social and Personality Development

CPsy 4334—Children, Youth in Society

CPsy 4343—Cognitive Development

CPsy 4994—Directed Research in Child Psychology

and/or CPsy 4996—Field Study in Child Psychology

One CPsy elective (4 cr)

Final Project

Senior project (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, they take CPsy 3308—Introduction to Research Methods; two course (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 while unveiling for them the richness of Chinese literature through panoramic overviews in English and selected readings in the original language.

Admission to the B.A. program requires completion of all pre-major requirements with a letter grade of B and above.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including at least 35 credits in the major.

The curriculum has three course categories: language sequences, surveys (in English), and topics/studies courses.

Required Courses

Premajor Requirements

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)

Major Requirements (37 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 premajor requirement, 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 are also required.

Classical Civilization

Department of Classical and Near Eastern Studies

B.A.

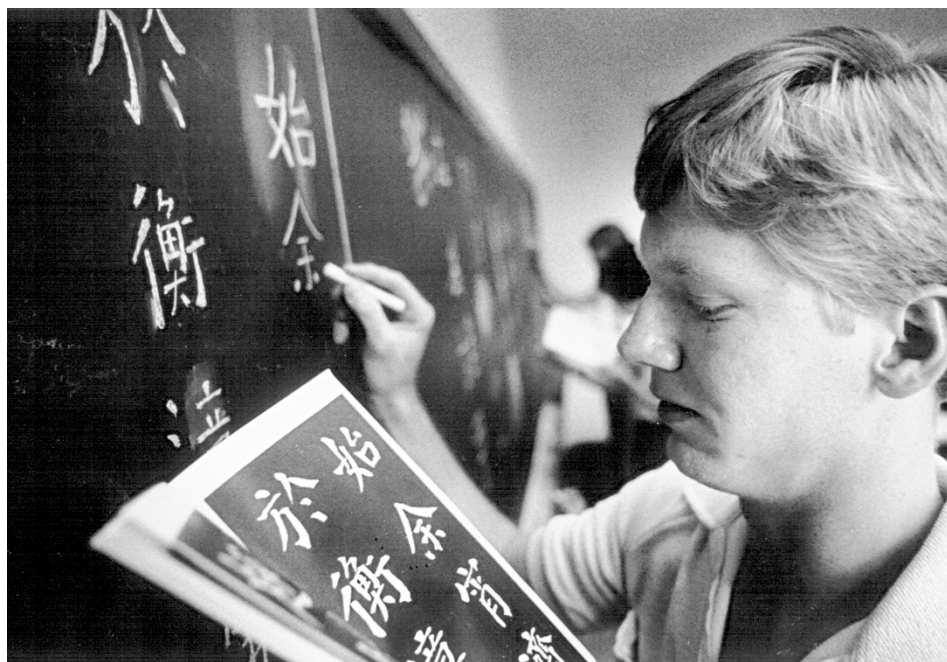
This interdisciplinary program encompasses the study of Greek and Roman cultures and their influence on Western civilization and encourages study of related or parallel cultures such as those of Islam and the Indian subcontinent. It provides a comprehensive alternative to more specialized majors that focus primarily on one aspect or subject matter of classical antiquity and the spheres of its influence, such as art, 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.

Admission Requirements—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 program chair to outline distribution requirements and should bring along a current transcript to this and all subsequent meetings with their adviser.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including satisfying the CLA language requirement in Greek or Latin and at least 36 credits in the major. Students complete 12 approved courses, 8 of them at or above the 3xxx level, including two courses with the CICv 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 students are required to complete a senior project that may be in the form of a research paper. 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 (0-3) 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.

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—

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

Applicants must have a minimum modified GPA of 2.50 (all grades from repeated attempts of each grade count) in the required math and CSci courses listed above, and must complete all these courses with a grade of C- or better.

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.

Since 1992 the dance program has been invited to four consecutive National American College Dance Festivals at the Kennedy Center in Washington, DC.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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 (ten courses)

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 (ten courses)

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

To complete the degree, students must complete at least 120 credits, 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 9 credits of dance-related academic electives. Major coursework must be taken A-F.

Required Courses

Dnce 1401—Introduction to Dance (3 cr)

Dnce 1402—Dance History (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 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 (3 cr)

Technique electives (1 or 2 credits each; 4 credits required)

Dance-related academic electives (1-3 credits each; 9 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

To complete the degree, students must complete at least 120 credits, 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 9 credits of dance-related academic electives. Major coursework must be taken A-F.

Required Courses

Dnce 1401—Introduction to Dance (3 cr)

Dnce 1402—Dance History (3 cr)

Dnce 1500—Topics in Dance (1 cr)

Dnce 1500—Topics: 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 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 (3 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; 9 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

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 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 (waived for students who receive a grade of A in 3011); 6 credits, selected in consultation with the adviser, from Dtch 3310, 3510, 3610; and one additional, related 3xxx or 5xxx course, selected in consultation with the adviser.

East Asian Studies

Institute for Global Studies

B.A.

This program uses an interdisciplinary approach to introduce students to the languages and cultures of East Asia. The major in East Asian studies emphasizes the humanities and social sciences to examine a topical theme. Courses may be taken in Chinese, Japanese, history, geography, sociology, political science, and art history. Courses offered by other departments (such as economics) may also be used to fulfill major requirements.

Admission Requirements—Students are admitted to the East Asian studies major after completing a minimum of 30 credits with good standing in CLA; at least two semesters of East Asian language study (or equivalent, as determined by the relevant language department); Area 3144—Introduction to Area Studies; and formally enrolling in the major at the Area Studies Programs advising office (214 Social Sciences Building). All premajor courses must be taken A-F and completed with a grade of C- or better.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including 37 credits in the major. The major requirements are distributed among language courses, a methods course, a breadth requirement, a concentration, and a senior project. All major courses must be taken A-F and completed with a grade of C- or better.

Required Courses

Methods

One course (3 credits) dealing specifically with approaches to and/or methods of scholarly inquiry in the social sciences, history, literature, or humanities, depending on the nature of the student's major program.

Breadth

Three courses or a minimum of 9 credits from the following: EAS 3211/Geog 3211—Geography of East Asia, EAS 3461/Hist 3461—Introduction to East Asia I: The Imperial Age, EAS 3462/Hist 3462—Introduction to East Asia in Modern Times 1600-2000; and one 3xxx-5xxx humanities course focusing on East Asia.

Concentration

At least five 3xxx-5xxx courses (15 credits), including two courses (3 credits each) in upper division humanities, literature or culture courses and two courses (3 credits) in upper division social science or history; and Area 4504—Senior Project.

Electives—Because this is an interdisciplinary program, other programs or departments offer many of the courses. For course approval and/or a list of courses that may be applied to the major, contact the area studies adviser in 214 Social Sciences Building.

Language Requirements

The minimum foreign language requirement for the East Asian studies major may be fulfilled by successful completion of one of the following: (1) three years (total of six semesters) of an East Asian language (Japanese or Chinese); (2) at least four semesters of an East Asian language (Japanese or Chinese) and at least four semesters of language study in a second language relevant to the student's academic program; or (3) at least four semesters of an East Asian language (Japanese or Chinese) and an approved study abroad experience in East Asia. For a concentration with a Korean focus it is possible to have a comparable level of Korean in lieu of Chinese or Japanese requirements.

Note: Proficiency examinations and evaluations are provided by relevant language departments.

Minor Requirements

Students take four semesters of an East Asian language; EAS 3211—Geography of East Asia; EAS 3461—Introduction to East Asia I: The Imperial Age or EAS 3462—Introduction to East Asia in Modern Times 1600-2000; at least two 3xxx-5xxx courses in the humanities dealing with East Asia or a single East Asian society; and at least one 3xxx-5xxx course in the social sciences dealing with East Asia or a single East Asian society.

Economics

Department of Economics

The three economics majors emphasize critical thinking and the understanding of basic economic principles. The program offers three degrees: the B.A., the B.A.-quantitative emphasis, and the B.S. The B.A. gives students a solid background in economics, is the least quantitative of the three majors, and provides excellent preparation for students interested in working immediately after graduation or considering law school. The B.A.-quantitative emphasis adds basic quantitative training (in calculus, linear algebra, and econometrics) and best suits students considering graduate work in business administration. The B.S. is for students interested in graduate study in economics or in a career where quantitative economic analysis plays a significant role. The strong quantitative component in this degree emphasizes multivariate calculus, linear algebra, and econometrics.

Students choose from courses in comparative economic systems; economic theory; econometrics; economic development; game theory; industrial organization; cost-benefit analysis; environmental, financial, international, mathematical, monetary, public, and labor economics.

Based on a survey taken every 10 years, the economics program ranked #10 nationwide in the National Research Council's 1995 report.

B.A.

Admission Requirements—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

To complete the B.A., students must complete at least 120 credits, including 34 credits in the major. 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.

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
EngC 3027—Advanced Expository Writing

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.

BFin 3001 or 4301
ApEc 3040, 3070, 3500, 4480, 4610, 4820, or any 5xxx 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 1142—Short Calculus
or Math 1271—Calculus I (or equiv)
Econ 3101—Intermediate Microeconomics (or equiv)
Econ 4301—Economic Development
or Econ 4331—Economic Development
Econ 4307—Comparative Economic Systems
or Econ 4337—Comparative Economic Systems
Econ 4431—International Trade
and Econ 4432—International Finance
or Econ 4401—International Economics

One from:

Econ 4313—The Russian Economy
or Econ 4315—Japanese Economy
or Econ 3960—Topics in Economics: The Chinese Economy
or Econ 4311—Economy of Latin America

Applied Microeconomics Minor

Math 1271—Calculus I (or equiv)
Econ 3101—Intermediate Microeconomics (or equiv)
Econ 3501—Labor Economics
or Econ 4531—Labor Economics
Econ 3601—Industrial Organization and Antitrust Policy
or Econ 4631—Industrial Organization and Antitrust Policy
Econ 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.

Admission Requirements—Econ 1101—Principles of Microeconomics, Econ 1102—Principles of Macroeconomics, Math 1271—Calculus I, and Math 1272—Calculus II. A minimum GPA of 2.50 is required in these four preparatory courses and a minimum grade of C- in each course. If a student retakes any of these four courses, an average of the grades for the course will count toward the GPA.

Degree Requirements

To complete the B.S., students must complete at least 120 credits, including 40 credits in the major. Students take Econ 1101 and 1102 and Math 1271 and 1272 before declaring the major. Students need a minimum GPA of 2.50 in these four courses. 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. Some 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.

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

EngC 3027—Advanced Expository Writing

Electives—A maximum of two courses may be taken from the following courses in accounting, finance, and applied economics and applied to the 12 credits of economics upper division courses.

Fina 3001 or 4301

ApEc 3040, 3070, 3500, 4480, 4610, 4820, or any 5xxx ApEc course

Minor Requirements

Economics offers six minors; see B.A. degree.

B.A.-Quantitative Emphasis

Admission Requirements—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 32 credits in the major. 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. Some 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.

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

EngC 3027—Advanced Expository Writing

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 or 4301

ApEc 3040, 3070, 3500, 4480, 4610, 4820, or any 5xxx 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.

Admission Requirements—Students must have a GPA of at least 2.50 in English literature courses and have taken one 3xxx English literature course.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including at least 35 credits in the major. 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.

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; EngC 3601, 3602, 3603, 3605, 3606, 3611, 3612, 3613, 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). 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

B.A.

Dramatic changes in post-Cold War Europe present an exciting challenge to students interested in Europe. The European area studies program provides a broad interdisciplinary introduction to this region. The major allows students to concentrate on one country or culture, a subregion of Europe, or issues of regional impact. Students take courses across disciplinary boundaries that include, but are not restricted to, many departments in CLA, and are encouraged to include courses conducted in a language other than English.

Admission Requirements—Students are admitted to the European area studies major after completing a minimum of 30 credits with good standing in CLA; at least two semesters of a European language (or equivalent, as determined by the relevant language department); Area 3144—Introduction to Area Studies; and formally enrolling in the major at the Area Studies Programs office (214 Social Sciences Building). All premajor courses must be taken A-F and completed with a grade of C- or better.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including 37 credits in the major. The major requirements are distributed among language courses, a methods course, a breadth requirement, a concentration, and a senior project. All major courses must be taken A-F and completed with a grade of C- or better.

Required Courses

Methods

One course of at least 3 credits dealing specifically with approaches to and/or methods of scholarly inquiry in the social sciences or humanities, depending on the nature of the student's major program.

Breadth

Core set of courses that address Europe as a holistic region, including Geog 3161—Geography of Europe; Hist 3707—Social History of Modern Europe; and one 3xxx-5xxx course (3 credits) in the humanities.

Concentration

At least five 3xxx-5xxx courses (15 credits), including two courses (3 credits each) in upper division humanities, literature or culture courses and two courses (3 credits) in upper division social science or history; and Area 4504—Senior Project.

For a complete list of European area studies courses, see the area studies programs adviser.

Electives—Consult the Area Studies Program office for course approval.

Language Requirements

The minimum foreign language requirements for the European Area Studies major may be fulfilled by successful completion of one of the following: (1) three years (total of six semesters) of a European language sequence; (2) at least four semesters of European language study and at least four semesters of language study in a second European language; or (3) at least four semesters of foreign language study and an approved study abroad experience in Europe.

Note: Proficiency examinations and evaluations are provided by relevant language departments.

Minor Requirements

Students must complete the CLA second language requirement in a European language and take five courses (at least 15 credits) of 3xxx-5xxx coursework focusing on a particular topic in European area studies (excluding language courses). Courses must include Geog 3161—Geography of Europe, Hist 3707—Social and Economic History of Modern Europe, and 6 credits of humanities. A maximum of 3 credits may be in directed studies or directed research and courses must be from a minimum of three different departments. All courses must be taken A-F with a grade of C- or better. The minor program must be approved by the area studies adviser.

Film Studies

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

To complete the B.A., students must complete at least 120 credits, 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

ArH 1921—Introduction to Film Study or CSCL 1921—Introduction to Film Study

ArH 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 ArH 1921—Introduction to Film Study, ArH 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.

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 use any language and/or, with adviser approval, may substitute additional country-specific coursework for part or all of the language requirement.

French

Department of French and Italian

B.A.

The French 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 major with another major, or choose to minor in French. The department offers selected courses in English for students who have not mastered French but want to study France and the French-speaking world.

Admission Requirements—Students must have taken Fren 1001-1002—Beginning French and Fren 1003-1004—Intermediate French or equivalent courses.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including 35 credits in the major. To ensure that all majors possess an adequate knowledge of the French language, the core of the major consists of 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. The rest of the core includes courses in phonetics, civilization, and literature. A linguistics course (offered outside the department), serves as the prerequisite to most French linguistic courses. Through their 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.

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

Department of French and Italian

B.A.

The French and Italian 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.

Admission Requirements—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

To complete the B.A., students must complete at least 120 credits, 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

Geography

Geology

German

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 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

To complete the B.A., students must complete at least 120 credits, 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 39 credits in the major with a grade of C- or better. These credits include: three core courses, a modes of geographic inquiry course; one course in the geographic information, analysis, and representation track; and four 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

Geology and Geophysics

B.A.

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.

The National
Research Council
ranked the
geography program
#3 in the nation in
their 1995 report.

The German program
is ranked 11th in the
nation according to
the National
Research Council.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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, 1009, 1011, 1019, GC 1171, GC 1172. In addition, students choose a minimum of 14 credits of 2xxx courses from: Geo 2001, 2002, 2003, 2004, 2005, or 2006. 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, 1019, 2001.

German

Department of German, Scandinavian, and Dutch

B.A.

The German 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; these major and minor programs include the study of the respective spoken language, as well as of literature, philology, culture, and civilization.

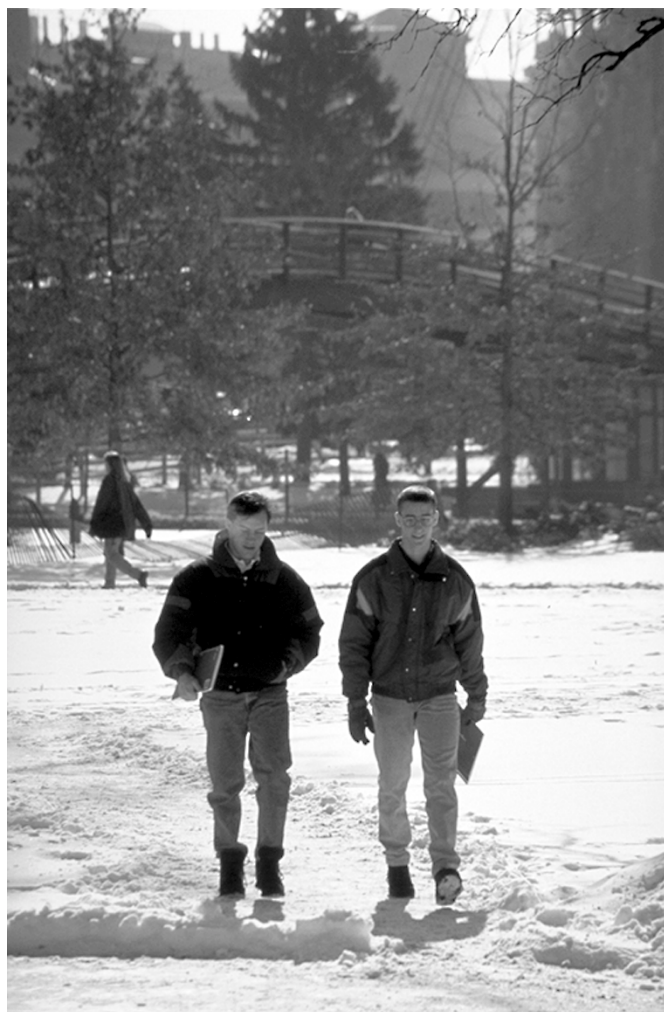
The department recommends study abroad in a German-speaking country for at least six months in order to acquire cultural familiarity and language fluency. Students may apply appropriate coursework to a German major or minor. The University is affiliated with exchange programs in Berlin and Freiburg for 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.

Admission Requirements—Students must have a passing score on the German Graduation Proficiency Test.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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 three emphases: literature and culture, history and society, and linguistics and philology. Students in the first two emphases may take one of these electives in programs 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: There are two first-year options: Ger 1001 and 1002 is the standard classroom sequence; Ger 1110 uses an individualized approach for the equivalent of the first two semesters of German. To enroll for second-year courses, CLA students must pass 1002, the 10th credit of 1110, or the Entrance Proficiency Test. Consult the department for more information on placement and testing.



German

Greek

Hebrew

History

History of Medicine

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—History of German Culture and Civilization

One of the following sequences—

Literature and Culture Emphasis

Three to four more courses in literature and film

One elective within the German program or outside, if the course examines German-speaking areas

History and Society Emphasis

Three to four more courses in history/society: 35xx, 45xx, 55xx. An advanced language course (30xx [beyond 3012] or 50xx course) may be substituted for one of these courses

One elective within the German program or outside, if the course examines German-speaking areas

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

Up to three of the ten courses for the German major may be taken in translation if a student does extra work in German (as directed by the instructor) in at least two of those courses. 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).

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, 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.

Admission Requirements—Students must have taken 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

To complete the B.A., students must complete at least 120 credits, 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 history, religion, art, or archaeology. 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: one course in ancient history, religion, art or archaeology above 3xxx; other credits from 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)

Electives—Students may take any 3xxx course or above in classics, Latin, Akkadian, ancient Near Eastern studies, Aramaic, Sanskrit, Sumerian, Coptic, religions in antiquity, classical civilization, and modern Greek.

Students may also take any of the above courses when cross-listed as ArTH, ReLA, Hebrew, MeSt, etc. Courses above 3xxx in history and art history concerned with Greek, Roman, and some medieval topics, and archaeological courses in anthropology by arrangement with the director of undergraduate studies may also be taken.

Final Project

A senior project is required; double majors in Latin and Greek are required to complete only one senior project. The project usually takes the form of a paper, but other forms of a project (e.g., oral performance of classical literature) 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 history, religion, art, or archaeology.

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 Foreign Studies 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.

Admission Requirements—Students must have taken Hebr 3012 or equivalent.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, 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

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

All students take Ling 3001—Introduction to Linguistics.

Electives—Any of the Jewish studies courses may be applied toward the major.

Final Project

A senior project (Hebr 3951) is required. Students majoring in Hebrew and Jewish studies are required to complete only one senior 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 3013 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, U.S.), 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 of world history), 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 premodern 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, 1017, 1018.
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 (world history)

Hist 1031-1032 (European civilization)

Hist 1301-1302 (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 four 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

Humanities in the West

Individualized Studies

Individually Designed Interdepartmental Major

International Relations

Italian

History of Science and Technology

Program in History of Science and Technology

Minor Only

This minor focuses on the origins and development of science and technology and their relations to the social, cultural, and philosophical currents of their time.

Requirements

Students take at least 14 credits of 3xxx-5xxx courses; at least 3 of these credits must be at 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. Not more than 25 percent of the total 3xxx-5xxx credits in the minor program may be taken S-N. 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.

Admission Requirements—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. application must be approved by faculty or department advisers with expertise in the areas of concentration.

In addition, some departments and colleges have established prerequisites 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 application procedures and on department and college prerequisites.

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 interdepartmental 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 and a maximum of 12 credits taken S-N 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. writing 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, which may be departmental or interdepartmental in composition. Thematic unity and coherence are basic requirements of the I.D.I.M. program.

Admission Requirements—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. Admission to the I.D.I.M. program is based on approval of the program by three faculty or department advisers with expertise in the areas of concentration.

In addition, some departments have established prerequisites 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 application procedures and department prerequisites.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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 interdepartmental in composition. At least 40 of the 50 credits must be 3xxx or above.

The program must also include a senior project of at least 2 credits, approved in advance by both faculty and staff advisers (part of the 50 credits total).

The Undergraduate Research Opportunities Program (UROP) offers financial awards to undergraduates for research, scholarly, or creative projects undertaken in partnership with a faculty member. Information is available in 325 Johnston Hall, (612) 625-3853.

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. A maximum of 8 credits at the 1xxx and 2xxx level and 8 credits at or above 3xxx taken S-N may be applied to the major. No course in which a grade of D has been earned may be applied to 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. Projects may vary widely in form, depending on the students' majors. 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

B.A.

Students choose one of a series of curricular options or "tracks" such as diplomacy and interstate relations, international development, international political economy, international relations and the environment, international society and politics, and immigration and refugees. The curricular options and track requirements are described in the *International Relations Major Handbook*, available in 214 Social Sciences Building.

All tracks require IntR 3101—International Relations: Practice and Theory, one upper division quantitative methods course in the social sciences, and completion of a major project.

Students must also demonstrate proficiency in a foreign language.

Admission Requirements—To be accepted into the major, students must complete the following, with a GPA of 2.25 or better, with no grade lower than C-: Econ 1101—Principles of Microeconomics and 1102—Principles of Macroeconomics; one other social science course relevant to international relations; two semesters of second-language study (or equivalent as determined by the relevant language department).

Students who have completed the premajor requirements must formally enroll in the major at the undergraduate advising office, 232 Social Sciences Building. The student and an adviser must develop a program that meets the major guidelines listed in the handbook. Students with questions about the premajor or major requirements or the various tracks are encouraged to contact the international relations advisers.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including at least 32 credits in the major.

A total of 32 upper division credits (3xxx or 5xxx courses), including IntR 3101, an upper division quantitative methods course in social sciences, and an additional 6-12 credits at the upper division level in a foreign language. Each of the 32 credits must carry a grade of C- or better, and no course may be taken S-N. Each of the five programs or tracks of this major has a specific set of requirements listed in the *International Relations Major Handbook*. The major also requires completion of a major project.

Language Requirements

Students must demonstrate proficiency in a foreign language. Students who lack such proficiency must complete coursework specified for the language selected; the program offers courses on international relations taught in some languages. An early start on planning your program in this major is essential.

Italian

Department of French and Italian

B.A.

The Italian 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.

Admission Requirements—Completion of Ital 1001-1004 or equivalent.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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.

Admission Requirements—Required preparatory courses for admission to the undergraduate major include 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

To complete the degree, students must complete at least 120 credits, including at least 36 in the major.

Four 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, Jpn 4061 or 4062—Classical Japanese, and Jpn 4041, 4042—Advanced Japanese Conversation and Composition.

The course in linguistics is Jpn 3451—Introduction to Japanese Linguistics.

The introductory literature course must be chosen from among Jpn 3162, 3163, and 3164.

Students must take three additional courses with the Jpn designator, including one at the 5xxx level.

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 four 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

To complete the degree, students must complete at least 120 credits, 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

The average
freshman entering
CLA ranks in the top
20 percent of his or
her graduating high
school class.

Language Requirements

All majors must complete at least two years of Hebrew language study, including Hebr 1001-1002—Beginning Hebrew I-II and Hebr 3011-3012—Intermediate Hebrew I-II. The course sequence of Hebr 3201-3202—Readings in Biblical Hebrew I-II may be substituted for Hebr 3011-3012.

Final Project

A senior project is required, though double majors in Hebrew and Jewish Studies are required to complete only one senior 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 two tracks of B.A. major programs: 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-, taking the SAT II Writing Test 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 must pass a keyboarding test at 40 wpm with 6 or fewer errors 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.

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

To complete the degree, students must complete at least 120 credits, including at least 33 credits in the major.

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, 4251, 4274, 4316, 4501, 4531, 4611, 4615, 4721, 4725, 4726, 4731, 4801, 5541, 5601, 5606, 5741, 5771, 5777, 5825.

Independent study 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

Students must complete the required core course of Jour 3004—Information for Mass Communication, with at least a C-.

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, 4251, 4316, 4501, 4531, 5541
- IV. Media and Society: Jour 3745, 3771, 3776, 3796, 4274, 4721, 4725, 4726, 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, 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.

Completion of EngC 1011—University Writing and Critical Reading (or equivalent or exemption) and two writing intensive courses outside journalism.

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 with grades of C- or better.

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, with at least a C-.

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

Four credits of journalism core course: Jour 3101—Newswriting and Reporting, with a C- or higher grade.

12 credits of professional (skills) courses chosen in consultation with a faculty adviser from the following list: Jour 3121, 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 or independent study courses chosen in consultation with a faculty adviser.

Advertising/Public Relations Concentration

- 3 credits of core course: Jour 3159—Public Relations or Jour 3201—Principles of Advertising, with a C- or higher grade.
- 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 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.
- Completion of EngC 1011—University Writing and Critical Reading (or equivalent or exemption) and two writing intensive courses outside journalism.

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) with grades of C- or better.

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.

To study the Latin language is to see the means of human communication stripped to its bare essentials. It is also the way to enjoy a large range of literature written over more than a millennium and a half. The major in Latin 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

To complete the degree, students must complete at least 120 credits, 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 civilization may include courses in Greek and other ancient languages, but at least one must be concerned with history, religion, art, or archaeology. 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, of which one course must be in culture, history, religion, art or archaeology above 3000, and the rest may be additional 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)

Electives—Any course above the 3xxx level in Classics, Latin, Akkadian, Ancient Near Eastern, Aramaic, Sanskrit, Sumerian, Coptic, Religions in Antiquity, Classical Civilization, Modern Greek.

Any of the above courses when cross-listed as ArtH, RelA, Hebrew, MeSt, etc.

Courses above 3xxx in history and art history concerned with Greek, Roman and some medieval topics, and archaeological courses in anthropology by arrangement with the director of undergraduate studies.

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 (e.g., oral performance of Latin literature) 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 history, history of art, religion, archaeology.

Latin American Studies

Institute for Global Studies

B.A.

The proximity of Latin America to the United States and the long history of interaction with the region provides a strong incentive for the study of Latin America. The program offers a wide range of interdisciplinary courses in several Twin Cities campus colleges and through foreign study programs. Students are especially encouraged to include courses conducted in Spanish or Portuguese in their programs, whether they are offered abroad or on campus. Students can choose a special thematic or regional concentration (for example, human rights, women in Latin America, economic development, Brazil, Mexico, the Caribbean).

Admission Requirements—Students are admitted to the program upon completion of premajor requirements and formal enrollment in the major at the Area Studies Programs office (214 Social Sciences Building). All premajor and major courses must be taken A-F and completed with a grade of C- or better.

To be accepted into the major, students must complete the following requirements: at least 30 credits and good standing in CLA; at least two semesters of Spanish or Portuguese (or equivalent, as determined by the relevant language department); and Area 3144—Introduction to Area Studies.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including at least 37 credits in the major.

The program's interdisciplinary approach emphasizes the humanities and social sciences to examine a topical theme in a Latin American location. This approach requires proficiency in a foreign language, a theoretical framework, broad knowledge of the area in question, and a concise understanding of the topical focus. Students take courses across disciplinary boundaries that include, but are not restricted to, several CLA departments.

Required Courses

Methods

One course of at least 3 credits dealing specifically with approaches to and/or methods of scholarly inquiry in the social sciences or humanities, depending on the nature of the student's major program.

Breadth

Core set of 3xxx-5xxx courses that address Latin America as a holistic region, including Geog 4121—Latin America; Hist 3401—Early Latin America to 1825 or Hist 3402—Modern Latin America 1825 to Present; and one course of at least 3 credits in the humanities (such as art, dance, literature).

Concentration

At least five 3xxx-5xxx courses (15 credits), including two courses (3 credits each) in upper division humanities, literature or culture courses and two courses (3 credits) in upper division social science or history; and Area 4504—Senior Project.

For a complete list of Latin American Area Studies courses, see an Area Studies Program adviser.

Electives—Consult the Area Studies Programs office for course approval.

Language Requirements

The minimum foreign language requirement for the major may be fulfilled by successful completion of one of the following: (1) three years (totaling six semesters) of Spanish or Portuguese language sequence, including either Span 3015—Spanish Composition and Communication or Port 3003—Portuguese Conversation and Communication and one other Port or Span 3xxx course. Topical courses taught as part of the Foreign Language Immersion Program (FLIP)/Spanish may qualify as alternatives to a 3xxx course; (2) at least four semesters of a Spanish or Portuguese language sequence and at least four semesters of language study in a second appropriate language; (3) at least four semesters of Spanish or Portuguese and an approved study abroad experience in Latin America. Students choosing a concentration with a Caribbean focus can petition to substitute a comparable level of French or Dutch for the Spanish or Portuguese requirements.

Note: Proficiency examinations and evaluations are provided by relevant language departments.

Minor Requirements

The minor requires successful completion of Span 1004 or Port 1104 (or equivalent), plus five 3xxx-5xxx courses (totaling at least 15 credits) related to Latin America. Courses must include Geog 4121—Latin America; Hist 3401—Early Latin America to 1825 or Hist 3402—Modern Latin America 1825 to Present; 6 credits of humanities; and 3 additional credits.

A maximum of 3 credits may be in directed studies or directed research and courses must be drawn from a minimum of three different departments. All courses must be taken A-F, with a grade of C- or better. The minor program must be approved by the area studies adviser.

Linguistics

Institute of Linguistics 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

To complete the degree, students must complete at least 120 credits, 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 with equivalent knowledge of the language). 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.

Linguistics

Mathematics

Medieval Studies

Microbiology

Music

The University of Minnesota Marching Band has nearly 300 members. It was formed in 1892 as a Cadet Corps with only 29 musicians.

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.

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.

The School of Mathematics offers a program leading to a B.A. degree through CLA. The course of study is very flexible and can be adapted to satisfy a wide variety of interests and needs. Programs can focus on preparation for graduate study in mathematics or teaching in secondary school, or can emphasize various fields of interest such as applied mathematics, computer science, or actuarial science.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including at least 40 credits in the major.

Students must complete a lower division mathematics sequence of five semesters (or four if in the honors sequence). Then students must take six upper division mathematics courses, including two courses in algebra and two courses in analysis; a senior project is also required.

Math majors must take all required mathematics and composition courses A-F and must earn a grade of C- or better in all of those courses.

Required Courses

To fulfill the lower division requirement, students must complete one of the following sequences:

Math 1271-1272-2243-2263-2283

or Math 1371-1372-2373-2374-2283

or Math 1571-1572-2573-3574.

To fulfill the upper division requirements, students must complete six upper division math courses*, plus a senior project.

Of these six courses, two must be chosen from a list of courses certified to satisfy the algebra requirement. Similarly, two courses must be chosen from a list certified to satisfy the analysis requirement. These lists may be updated from time to time.

To satisfy the algebra requirement, a student must take two courses from this list: Math 5285, 5286, 4242, 5248, 5251, 5711, 5385; 5705 or 5707 (only one of 5705 or 5707 may be used to satisfy this requirement).

To satisfy the analysis requirement, a student must take two courses from this list: Math 5615, 5616, 4606, 5525, 5535, 5587, 5583, 5651, 5652, 5654, 5486.

*The following upper division mathematics courses cannot be used to satisfy part of the six course upper division math requirement: Math 4457 or 4458—*Methods of Applied Math I or II*, 4512—*Differential Equations with Applications*, 3113 or 3118—*Topics in Elementary Mathematics I and II*

Electives—The School of Mathematics will accept the following courses from other departments as part of the six-course upper division mathematics requirement.

CSci 5301, CSci 5302, Stat 5101, Stat 5102.

Note: The content of Stat 5101 is the same as Math 5651—Basic Theory of Probability and Statistics.

Final Project

All CLA math majors must complete a senior project.

Minor Requirements

Complete all lower division requirements for the major, plus two approved upper division math courses.

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, theater 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.

Degree Requirements

Fifteen 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.

Minor Requirements

Medieval Studies offers only a free-standing minor at the undergraduate level. All courses applicable to the minor 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 courses applicable to the minor can be obtained from the Center for Medieval Studies.

Microbiology

Department of Microbiology

B.A.

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

To complete the degree, students must complete 120 credits, 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

- I. 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
- II. Choose one biochemistry course from BioC 3021 or BioC 4331
- III. Choose one genetics course from GCB 3022 or Biol 4003
- IV. MicB 3301—Biology of Microorganisms
- V. Choose four microbiology courses from MicB 4111, MicB 4121, MicB 4131, MicB 4141, MicB 4151, MicB 5352
- VI. 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).

Music

School of Music

B.A.

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.

Admission Requirements—Admission to the music program requires an audition and placement in a suitable level of applied music study. Transfer students are placed on the basis of an entrance audition and examinations in music theory, music history, and piano.

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; 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.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including at least 53 credits in the major.

Major requirements include five semesters of music theory, four semesters of musicology/ethnomusicology, and four semesters of applied music and ensembles. Additional work in piano and music research is also required.

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)

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.

Minor Requirements

A minor in music is available for students majoring in other fields. An entrance audition 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



CLA's Martin Luther King, Jr. (MLK) Program provides support, guidance, and information to enhance the undergraduate experience of students of color.

Music Education

School of Music

B.M.

The B.M. in music education is offered with two concentrations: instrumental/general or choral/general music.

Admission Requirements—See Music B.A. for admission requirements.

In addition, students must meet the School of Music entrance requirements for performance in one of the following areas of applied music: voice, piano, organ, classical guitar (for the choral/general concentration); a standard band or orchestral instrument (for the instrumental concentration); an extensive background in high school instrumental or vocal music ensembles is expected. Private lessons in voice or on a band/orchestral instrument are recommended. Precollege preparation in music theory, music history, conducting, piano, and youth leadership activities also prove helpful.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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 (10.5 cr)

EdHD 5001—Learning, Cognition, and Assessment in the Schools

EdHD 5003—Developmental and Individual Differences in Educational Contexts

EdHD 5005—School and Society

EdHD 5009—Human Relations: Applied Skills for School and Society

PubH 5003—Fundamentals of Alcohol and Drug Abuse

In addition to the above coursework, students must choose and complete the coursework for one of the following concentrations.

Instrumental/General Music Education Concentration

Students successfully completing the program will meet licensure requirements to teach band, orchestra, and general classroom music to grades K-12 in Minnesota.

Required Courses (36 cr)

Mus 1260—Voice Class

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).

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, keyboard, 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 to 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).

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.

Music Therapy

School of Music

B.M.

This program prepares students to use music to influence behavioral changes in children and adults in educational and medical environments.

Admission Requirements—See Music B.A. for admission requirements.

In addition, students must meet the School of Music entrance requirements for performance in one of the following areas of applied music: voice, piano, organ, classical guitar, or a standard band or orchestral instrument. An extensive background in high school instrumental or vocal music ensembles is expected. Private lessons in voice or on a band/orchestral instrument are recommended. Precollege preparation in music theory, music history, piano, conducting, and youth leadership activities also prove helpful.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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 8 credits lower division major lessons (13xx) and 4 credits secondary lessons (14xx).

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.

Final Project

A six-month internship is required upon completion of all coursework. You should meet with your major adviser early in the spring semester of your junior year to plan the internship. You must have completed all coursework to be eligible to register for MuEd 3855—Music Therapy Internship (12 cr).

Music-Jazz Studies**School of Music****B.M.**

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 Music B.A. for admission requirements.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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

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

Final Project

A senior recital is required: Mus 0951—Senior Recital.

Music-Performance**School of Music****B.M.**

The B.M. program is for students who wish to complete professional studies in performance.

Admission Requirements—See Music B.A. for admission requirements.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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 33xx (24 cr)

Mus 0951—Senior Recital (0 cr)

Music-Performance

Philosophy

Physics

Physiology

Political Science

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 0901—Junior Recital (0 cr)

Mus 5141—Piano Literature (2 cr)

Organ Majors

Mus 0901—Junior Recital (0 cr)

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.

Final Project

A senior recital is required for all programs in the Performance B.M. (Mus 0951—Senior Recital). Piano and organ majors also must prepare a junior recital (Mus 0901—Junior Recital).

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

To complete the degree, students must complete at least 120 credits, 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

At least 14 credits in philosophy courses at the 3xxx level or above.

Physics

School of Physics and Astronomy

B.A.

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

To complete the degree, students must complete at least 120 credits, 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

To complete the B.A., students must complete at least 120 credits, 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. 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 take two individualized honors courses in physiology, and summa candidates must write an approved summa thesis.

Required Courses

Phsl 3071—Principles of Physiology for Majors

Chem 2301—Organic Chemistry I

Chem 2302—Organic Chemistry II

Chem 2311—Organic Lab

BioC/Biol 3021 or BioC 3001 or BioC 4331—Biochemistry

Biol 4003—Genetics

Biol 4004—Cell Biology

Two electives from a broad range of math- or science-related courses

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, politics and behavior, American governmental systems and processes, and public law.

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.

Admission Requirements—All students must complete one 1xxx course in political science with a grade of C- or better before admittance to the major.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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 politics/politics and behavior/public law, 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 with a grade of B or better.

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, 4481, 4833, 4889, 4307, 4308, 4315, 4327, 4523

Campaigns and elections: Pol 3110, 3085, 3225, 3471, 4461, 3766, 4737, 4767, 4306, 4308

Citizenship and civic action: Pol 3110, 3225, 3235, 3251, 3252, 3253, 5251, 5252, 5253, 4275, 4766, 4885, 3739, 4303, 3323, 4502

Global politics: Pol 3110, 3661, 3471, 3477, 5461, 3835, 3836, 5323, 5875, 5877, 5881, 5883, 5885, 5886, 5889

Law and politics: Pol 3110, 3679, 5655, 5656, 3872, 5657, 5881, 5883, 3309, 3331, 3323, 3561, 5501, 5502, 5523

Political Science

Psychology

Religious Studies

Russian

Russian Area Studies

Democratization and development: Pol 3110, 3235, 3253, 5253, 4275, 3471, 3477, 4471, 4473, 4477, 4478, 4479, 4885, 4889, 3739, 4766, 4303, 3323, 4561

Political psychology, beliefs, and behavior: Pol 3110, 3085, 3253, 4275, 3739, 4836, 3766, 4766, 4306, 4307, 4308, 3323

Public affairs: Pol 3110, 3085, 3235, 4481, 4836, 4832, 4881, 4833, 4306, 4307, 4308, 4309, 3321, 4315, 4322, 4327, 4501, 4523

Final Project

Students must submit a senior project or paper to the department. The paper or project should be completed in conjunction with registration in the 4-credit version of 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 politics/politics and behavior/public law, 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, Pol 3352—Fieldwork in the Legislature, 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 Adoption 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.

Admission Requirements—Psy 1001—Introductory Psychology.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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 completion of Psy 3902—Major Project in Psychology.

All courses used to fulfill minimum requirements must be taken A-F, except Psy 3902, which may be taken A-F or S-N.

Transfer students must complete at least four upper division 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 the following: Psy 3011, 3031, 3051, 3061 or 5061, 4011, 4036, 5012, 5013, 5014, 5015, 5031, 5034, 5036, 5037, 5038, 5051, 5054, 5061, 5062.

Two courses from the following: Psy 3101 or 5101, 3201, 3301, 3604 or 5604, 3617, 3666, 5202, 5204, 5205, 5206, 5207, 5606, CPsy 3301, CPsy 4303.

One course from the following: Psy 3135 or 5135, 3137 and/or 5137, 3711, 4801 (required for honors), 4501, 5121, 5136, 5138, 5501, 5701, 5702, 5703, 5705, 5862, 5865.

Electives from 3xxx, 4xxx, or 5xxx psychology courses to satisfy the minimum 36-credit requirement. (A total of two options from Psy 3960, 3993, 3994, and 3996 may be used as electives.)

Psy 3902—Major Project

Electives—CPsy 3301—Introductory Child Psychology for the Social Sciences, CPsy 4303—Adolescent Psychology.

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 C, one course from Group D, one course from Group E, and one elective course from any of the groups.

Natural/Biological Science Track

Three courses from Group C, and one course from the following: Psy 3101, 3135 or 5135, 3137 and/or 5137, 3604 or 5604, 3666, 5206, and 5606.

Social Science Track

Three courses from Group D, and one course from: Psy 3135 or 5135, 3711, 4501, 5138, 5501, 5701, 5702, 5703, and 5705.

Students select courses from the following three course groupings:

Group C Courses

Psy 3011, 3031, 3051, 3061, 5012, 5013, 5014, 5015, 5031, 5034, 5036, 5037, 5038, 5051, 5054, 5061, 5062

Group D Courses

Psy 3101, 3201, 3301, 3604, 3617, 3666, 5101, 5202, 5204, 5205, 5206, 5207, 5604, 5606

Group E Courses

Psy 3135, 3137, 3711, 4801, 4501, 5121, 5135, 5136, 5137, 5138, 5501, 5701, 5702, 5703, 5705, 5862, 5865

Religious 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, as well as in ancient philosophy and at least one other religious tradition. 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.

The psychology program has earned the rank of 7th in the nation according to the National Research Council's 1995 report.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including 31 credits in the major. The other, comprised of 24 credits, 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 modern study of the Old Testament, the New Testament, either Greek and Hellenistic religion or Roman religion and early Christianity, the religious studies seminar, a comparative course on another religious tradition, and a course on philosophy. A senior project is also required.

Required Courses

RelA/ANE 3251—Modern Study of the Old Testament
 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

Electives—Elective courses on religion, e.g., anthropology, philosophy, psychology, sociology, history.

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 Iranic and Turkic languages of Central Asia as well as literature and culture of the Slavic world and Central Asia. The unit offers a major and a minor in Russian language and literature.

Admission Requirements—Admission to the major requires 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

To complete the B.A., students must complete at least 120 credits, 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. In addition, students must complete 12 additional credits from the 3xxx and 5xxx courses, excluding preparatory courses. 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 3101, 3102 and 6 additional credits in 3xxx-5xxx Russian courses, excluding preparatory courses

Russian Area Studies

Institute for Global Studies

B.A.

Russian area studies provides students with the knowledge to better understand the Russian world, its history, culture, and restructuring in the post-Soviet era. As Russia redefines its place in the world, and as trade and cultural links between Russian and the United States grow, Russian area specialists are increasingly needed. Undergraduate major and minor programs are available in Russian area studies.

Admission Requirements—Students are admitted to the program after completing premajor requirements and enrolling in the major at the Area Studies Programs advising office (214 Social Sciences Building). All premajor and major courses must be taken A-F and completed with a grade of C- or better.

To be accepted into the major, students must complete the following requirements: at least 30 general credits and good standing in CLA; at least two semesters of Russian language study (or equivalent, as determined by the relevant language department); and Area 3144—Introduction to Area Studies.

Degree Requirements

To complete the B.A., students must complete at least 120 credits, including 37 credits in the major. The program's interdisciplinary approach emphasizes the humanities and the social sciences to examine a topical theme. This approach requires proficiency in a foreign language, a theoretical framework, broad knowledge of the area in question, and a concise understanding of the topical focus. To achieve this, students take courses across disciplinary boundaries that include, but are not restricted, to many departments in CLA.

Required Courses

Methods

One course (3 credits) dealing specifically with approaches to and/or methods of scholarly inquiry in the social sciences, history, literature, or humanities, depending on the nature of the student's major program.

**Russian Area
Studies**

**Scandinavian
Languages and
Finnish**

Sociology

Breadth

Core set of courses (three courses or a minimum of 9 credits), including Geog 3181—Russia and Environs

Hist 3636—Conquest, Colonization, and Centralization: The History of European Russia, ca. 700 to ca. 1700

or Hist 3637—Modern Russian: From Peter the Great to the Present and Russ 3421—Literature: Middle Ages to Dostoevsky in Translation

or Russ 3422—Literature: Tolstoy to the Present in Translation.

Concentration

At least five 3xxx-5xxx courses (15 credits), including two courses (3 credits each) in upper division humanities, literature, or culture courses and two courses (3 credits) in upper division social science or history; and Area 4504—Senior Project.

Electives—Because this is an interdisciplinary program, substantial portions of the coursework will be in other programs or departments. For course approval and/or a list of courses from other departments that may be applied to the major, contact the area studies adviser in 214 Social Science.

Language Requirements

Students must complete one of the following: 1) three years (total of six semesters) of Russian language; 2) at least four semesters of Russian language and at least four semesters of language study in a second language relevant to the student's academic program; or 3) at least four semesters of Russian language study and an approved study abroad experience in Russia or Eastern Europe.

Note: Proficiency examinations and evaluations are provided by relevant language departments.

Final Project

A senior paper is required, and will normally be written as a part of Area 4504—Senior Project.

Minor Requirements

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:

Russ 3421—Literature: Middle Ages to Dostoevsky in Translation

or Russ 3422—Literature: Tolstoy to the Present in Translation

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
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

Students must complete at least two courses in humanities. The minor must be approved by the area studies adviser.

Scandinavian Languages and Finnish

Department of German, Scandinavian, and Dutch

B.A.

The program teaches and conducts research in the languages and literature of the Scandinavian countries, including Finland, in the context of relevant cultural-historical background. Majors and minors are offered with concentrations in Danish, Finnish, Norwegian, and Swedish.

Admission Requirements—Passing score on graduation proficiency test in Danish, Finnish, Norwegian, or Swedish.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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 in Scandinavian. 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.



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

To complete the degree, students must complete at least 120 credits, 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).

Admission Requirements—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 credit) in conjunction with an upper division sociology elective (3 credits) 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).

Admission Requirements—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 list in Sociology B.A.

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 credit) in conjunction with an upper division sociology elective (3 credits) 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.

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

South Asian and Mideast Area Studies

Spanish

Spanish and Portuguese

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 Mideast Area Studies

Institute for Global Studies

B.A.

This program focuses on the cultural traditions and contemporary problems of Afghanistan, Bangladesh, India, Nepal, Pakistan, Sri Lanka, Turkey, Iran, and the Arab world. Flexible major and minor programs in South Asian and Middle Eastern Studies can meet the needs and interests of individual students. Programs must be designed in consultation with an adviser. For more information, consult the Area Studies Programs office.

Admission Requirements—Students are admitted to the program upon completion of premajor requirements and formal enrollment in the major at the Area Studies Programs office (214 Social Sciences Building). All premajor and major courses must be taken A-F and completed with a grade of C- or better.

Admission into the major requires completion of the following: at least 30 credits and good standing in CLA; at least two semesters of a South Asian or Middle Eastern language (or equivalent, as determined by the relevant language department); and Area 3144—Introduction to Area Studies.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including at least 37 credits in the major.

The program uses an interdisciplinary approach emphasizing the humanities and social sciences to examine a topical theme in a South Asian and/or Middle Eastern location. This approach requires proficiency in a foreign language, a theoretical framework, broad knowledge of the area in question, and a concise understanding of the topical focus. Students take courses across disciplinary boundaries that include, but are not restricted to, several CLA departments.

Required Courses

Methods

One course of at least 3 credits dealing specifically with approaches to and/or methods of scholarly inquiry in the social sciences or humanities, depending upon the nature of the student's major program.

Breadth

Core set of 3xxx-5xxx courses that address South Asia and/or the Middle East as holistic regions, including one course (at least 3 credits) in the humanities; one course (at least 3 credits) in the social sciences; and one course (at least 3 credits) of the student's choice. Both the Middle East and South Asia must be represented through the courses taken.

Concentration

At least five 3xxx-5xxx courses (15 credits), including two courses (3 credits each) in upper division humanities, literature or culture courses and two courses (3 credits) in upper division social science or history; and Area 4504—Senior Project.

For a complete list of South Asian and Middle Eastern Studies courses, see an area studies adviser.

Electives—Consult the Area Studies Programs office for course approval.

Language Requirements

This requirement is fulfilled by completion of two years (total of four semesters) of a South Asian or Middle Eastern language sequence and two 3xxx-5xxx literature courses of South Asian or Middle Eastern content.

Note: Proficiency examinations and evaluations are provided by relevant language departments.

Minor Requirements

The minor requires completion of five 3xxx-5xxx courses (totaling at least 15 credits) related to South Asia and the Middle East. Courses must be distributed as follows: minimum of one course (at least 3 credits) from the humanities; minimum of one course (at least 3 credits) from the social sciences or history.

A maximum of 3 credits may be in directed studies or directed research and courses must be drawn from a minimum of three different departments. All courses must be taken A-F, with a grade of C or better. The minor program must be approved by the area studies adviser.

Spanish

Department of Spanish and Portuguese

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 and Spanish-Portuguese) and two minors (Spanish and Portuguese). A combined minor in Spanish-Portuguese is not offered.

Course sequences emphasize four interconnected areas: oral and written fluency in the language; the study of Hispanic linguistics that incorporates the social and cultural context of the language; representative literature analyzed as artistic achievement and cultural expression; and civilizations and cultures in areas where Spanish and Portuguese are spoken.

The recent vast changes in the political, economic, and social spheres of those regions require students of Spanish or Portuguese to be familiar with world views allowing them to understand and adapt to a rapidly changing environment.

B.A. in Spanish

Degree Requirements

To complete the degree, students must complete 120 credits, including at least 34 credits in the major.

Students must declare a major in the department before completing the majority of major requirements; students must declare a minor at least one full term before completing the minor requirements.

Students must complete prerequisite beginning and intermediate Spanish courses (or equivalent) and complete the Graduation Proficiency Test.

Four advanced prerequisite courses in the areas of composition and communication, literature, culture, and linguistics are also required.

For information
about study abroad
programs, contact
the Global Campus,
102 Nicholson Hall,
(612) 626-9000.

Students must also complete 15–18 additional elective credits in 3xxx or 5xxx literature, culture, and linguistics courses. Elective courses must be chosen in consultation with the adviser. A major project is also required and may not be completed until the end of the major.

Required Courses

Span 3015—Spanish Composition and Communication

Span 3021—Advanced Communication Skills (elective credits may substitute for 3021 if an A or B is earned in 3015)

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 adviser.

Span 3972—Graduation Seminar

All major courses must be taken A-F, and grades of C- or better must be earned in all courses. Spanish and Portuguese courses taught in English and credits earned in community tutorial programs are not acceptable for major credit.

The department strongly encourages majors and minors to study abroad. Students who wish to study abroad must meet with the departmental adviser in advance to petition for departmental equivalency. Petitions may also be completed for courses transferred from other U.S. institutions. All questions regarding major or minor credit for courses taken outside the University should be directed to the departmental adviser.

Language Requirements

Although the department has a prerequisite of 5 credits in advanced language courses, students must understand that language proficiency goes beyond classroom studying and that proficiency will be a major factor in the Graduation Seminar.

The department very strongly emphasizes student initiative and responsibility in acquiring language proficiency. Recognizing that students must seek every opportunity to practice language skills, the department encourages study abroad and internships or field experience in the Hispanic community in the United States.

Final Project

All B.A. candidates must complete a major project. Students must conduct their research for the major project by registering and attending Span 3972—Graduation Seminar in one of the last two semesters of their senior year. The research topic will be chosen, discussed, developed, and completed in a group setting, under the instructor's supervision.

Minor Requirements

Required preparatory courses for the Spanish minor include Span 1001 and 1002—Beginning Spanish, Span 1003 and 1004—Intermediate Spanish, or equivalent. The Graduation Proficiency Test (GPT) must also be completed.

A total of 16 to 17 credits must be distributed as follows: Span 3015—Spanish Composition and Communication, Span 3021—Advanced Communication Skills (elective credits may substitute for 3021 if an A or B is earned in 3015), at least one 31xx course, and two additional courses at the 3xxx or 5xxx level chosen in consultation with the departmental adviser.

B.A. in Spanish and Portuguese

Admission Requirements—Span 1001 and 1002—Beginning Spanish, Span 1003 and 1004—Intermediate Spanish or equivalent, Port 1101 and 1102—Beginning Portuguese, Port 1103 and 1104—Intermediate

Portuguese or equivalent, Port 3001—Portuguese for Spanish Speakers or knowledge of Portuguese at this level.

Degree Requirements

The Spanish-Portuguese major is under review. Students interested in this major should consult the undergraduate adviser.

To complete the degree, students must complete at least 120 credits, including at least 35 credits in the major. Students must declare a major in the department before completing the majority of major requirements; students must declare a minor at least one full term before completing the minor requirements.

Five to six advanced prerequisite 3xxx courses in Spanish and Portuguese composition and communication, literature, culture and linguistics are also required. Students must then complete 12 to 15 additional elective credits in 3xxx or 5xxx literature, culture, and linguistics courses. Elective courses are to be chosen in consultation with the adviser. A major project is also required.

Required Courses

Span 3015—Spanish Composition and Communication

Span 3021—Advanced Communication Skills (elective credits may substitute for 3021 if an A or B is earned in Span 3015)

Port 3003—Portuguese Conversation and Composition

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 to 15 additional elective credits in upper division literature, culture, and linguistics courses, chosen in consultation with the adviser. (Minimum 6 credits each in Spanish and Portuguese.)

Span 3972—Graduation Seminar

All major courses must be taken A-F, and grades of C- or better must be earned in all courses. Credits earned in community tutorial programs are not acceptable for major credit, and courses taught in English are not acceptable for major credit unless work is done in Spanish or Portuguese and written approval is obtained in advance from the department.

Language Requirements

Although the department has a prerequisite of 5 credits in advanced language courses, students must understand that language proficiency goes beyond classroom study, and that proficiency will be a major factor in the Graduation Seminar.

The department very strongly emphasizes student initiative and responsibility in acquiring language proficiency. Recognizing that students must seek every opportunity to practice language skills, the department encourages study abroad and internships or field experience in the Hispanic community in the United States.

Final Project

All B.A. candidates must complete a major project. Majors in Spanish-Portuguese must conduct their research for the major project by registering and attending Span 3972—Graduation Seminar during one of the last two semesters of their senior year.

Students choose, discuss, develop, and complete the research topic in a group setting, under the instructor's supervision.

Minor Requirements

Portuguese Minor

Prerequisites

Port 1101 and 1102—Beginning Portuguese

Port 1103 and 1104—Intermediate Portuguese or equivalent
and passing of the GPT

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 (16 cr)

Port 3003—Portuguese Conversation and Composition, plus four courses at 3xxx or 5xxx level. All courses must be chosen in consultation with the departmental 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

To complete the degree, students must complete at least 120 credits, including at least 40 credits in the major.

Majors are advised to elect additional courses beyond those used to satisfy the minimum requirements of CLA's Liberal Education Requirements in the Diversified Core Curriculum category 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.

Required Courses

Students must complete 41 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 two clusters of study, including Communication: Social Interaction, and Communication and Culture.

Admission Requirements—Students seeking admission to the major must first meet with a speech-communication adviser in 432 Folwell 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

Students must achieve a 2.00 GPA average or better in Spch 1102 and 1313; these may not be retaken. A grade of F in either Spch 1102 or 1313 will result in ineligibility for the major.

Degree Requirements

To complete the degree, students must complete 120 credits, 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 following lists, including at least two 4xxx or 5xxx courses and one course chosen from among:

- Spch 3211—Introduction to U.S. Electronic Media
- Spch 3401—Introduction to Communication Theory
- Spch 3601—Introduction to Rhetorical Theory

Communication and Social Interaction Cluster

Spch 3190, 3211, 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, 3405, 3406, 3451, 3452, 3601, 3605, 3615, 3625, 3631, 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

Pre-minor

Spch 1101—Introduction to Public Speaking and Spch 1102—Introduction to Communication, with a 2.00 or better GPA. A grade of F in either course will result in ineligibility for the minor; no retakes will be allowed.

Minor

Five courses selected from the two clusters, with at least three courses from one cluster, and one from the other cluster. One of the 5 courses must be at the 4xxx or 5xxx level, and one of the courses must be Spch 3211—Introduction to U.S. Electronic Media, Spch 3401—Introduction to Communication Theory, or Spch 3601—Introduction to Rhetorical Theory.

Statistics

School of Statistics

B.A.

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

To complete the degree, students must complete 120 credits, 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

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

To complete the degree, students must complete at least 120 credits, 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 1901—Introduction to Performance

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 Neo-Classicism

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 24 credits:

Th 1901—Introduction to Performance

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

Department of Geography

This cross-disciplinary major involves urban studies coursework, fieldwork experiences, and introductory work 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 in public agencies or private business, or for 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 Colombia, Norway, and Minneapolis-St. Paul. Internships and independent field research projects are also available. Contact the Global Campus office for more information.

B.A.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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.

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*.

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.

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

and UrbS 3202—Urban Studies Colloquium

Two sessions of UrbS 3500—Urban Studies Workshop (6 cr total)

Two courses from one of the tracks described in the *Urban Studies Program Booklet*, (6 cr total).

B.S.

Degree Requirements

To complete the degree, students must complete at least 120 credits, 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.

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, multicultural, and international study of women and gender. The program strives to develop an interdisciplinary curriculum and body of knowledge comparing those issues across cultures, and significant social and historical variables. The program also seeks to transform traditional disciplines and 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 perspective; literature, 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. These include 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; Sociology; Spanish and Portuguese; 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 Peace and International Cooperation, and the Tucker Center for Research on Girls and Women in Sport, Center for Advanced Feminist Studies.

Degree Requirements

To complete the degree, students must complete at least 120 credits, including at least 40 credits in the major.

Required Courses

Students must complete 27 to 29 credits of required courses and three to five additional electives for a total of 40 credits.

WoSt 1001—Introduction to Women's Studies (4 cr)

One of the following 4-credit courses: WoSt 1002, 3001, 3002, 3003, 3004

WoSt 3101—History of Western Feminism (4 cr)

or WoSt 5101—History of Western Feminism (4 cr)

WoSt 3102—Feminist Thought and Theory (4 cr)

WoSt 5xxx elective covering application of feminist theory (3 cr)

WoSt 3xxx or 5xxx elective satisfying the department's cultural pluralism requirement (minimum 3 cr). Cannot use WoSt 3001, 3002, 3003, or 3004 to fulfill this requirement.

WoSt 3xxx or 5xxx elective satisfying the department's international studies requirement (minimum 3 cr). Cannot use WoSt 3001, 3002, 3003, or 3004 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.

Electives—This category includes all of the program's officially cross-listed courses: Chic 3212, 3402, 4401, 5403, 5505; Hist 3347, 3348; JwSt 3632; Rhet 5108; Soc 3221; Spch 3405.

Final Project

Women's studies majors must complete a senior project and complete WoSt 4107—Senior Seminar Research Methods (3 cr) and WoSt 4108—Senior Writing Seminar (2 cr) or WoSt 4109—Field Learning. Students also have the option of four different kinds of senior projects: academic scholarship, empirical research-based project, internship-based project, and creative project.

Students electing to pursue an internship-based project must take WoSt 4109—Field Learning (3 cr) during the semester of their internship work to replace WoSt 4108. Students electing to do research are required to have some formal training or coursework in their research methodology, and students pursuing creative projects must have some formal training or coursework in their area of creativity, such as poetry or creative writing, photography, dance, film, or video arts.

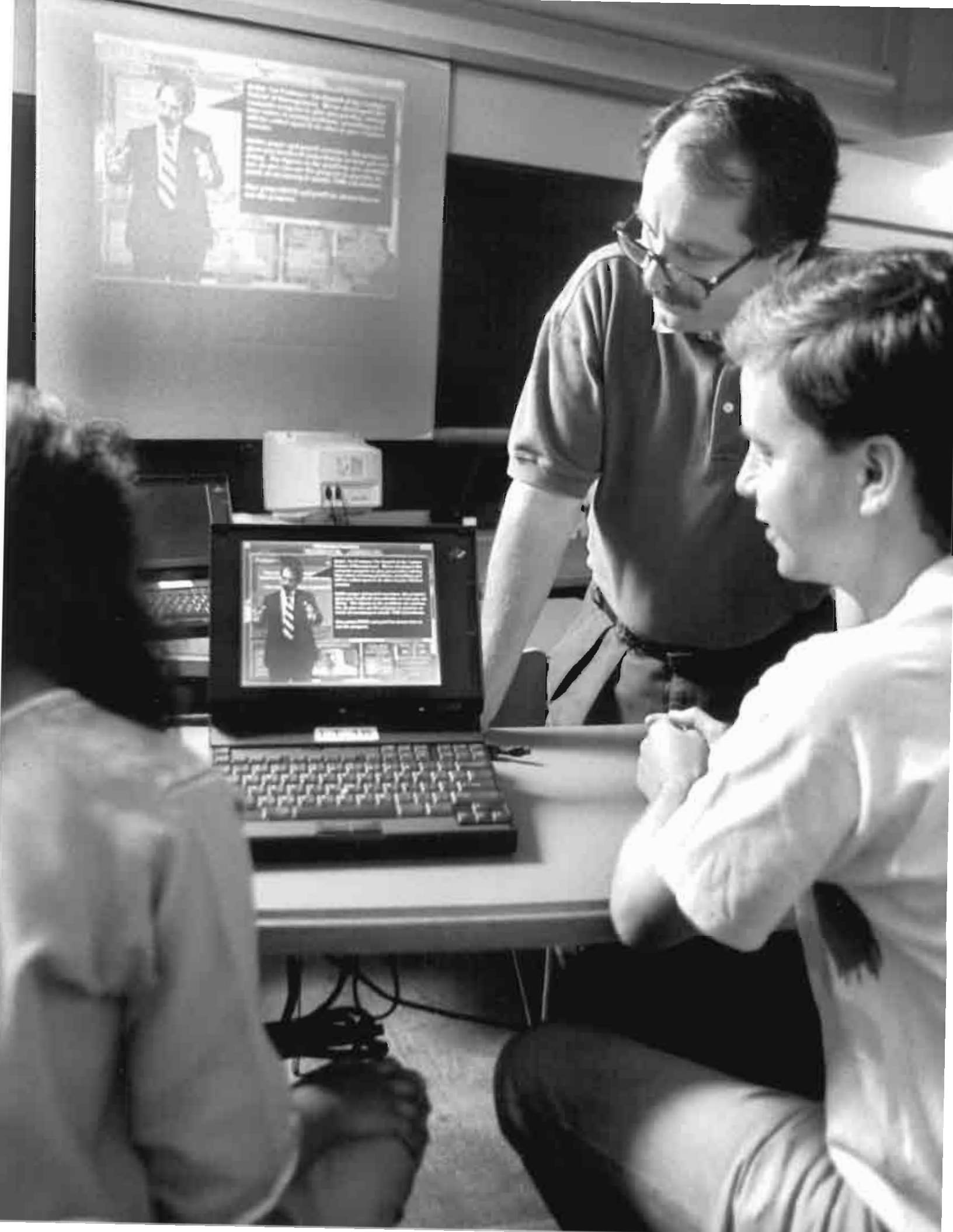
Minor Requirements

The women's studies minor requires WoSt 1001—Introduction to Women's Studies and 20 credits of 3xxx and 5xxx courses. No more than 4 credits may be taken S-N and no more than 8 credits may be directed study or internship projects.

Carlson School of Management

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of the University of Minnesota.

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Carlson School of Management

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.

Nearly one out of every four graduates of the Carlson School holds the title of vice president or above.

CSOM's undergraduate business program is routinely ranked in the top 10 of public 4-year business school programs.

History

- Founded in 1919
- Named the Curtis L. Carlson School of Management in 1986

Faculty and Staff

- 80 full-time faculty, including 24 endowed faculty
- 150 staff members

Alumni

- 36,000 alumni
- Located in 50 states, Washington D.C., and 64 foreign countries
- 67 Outstanding Achievement Awards

Rankings

- Ranked 13th among all business schools and 8th among all public business schools by *U.S. News & World Report*, 1996
- Evening M.B.A. program ranked 9th in country by *U.S. News & World Report*, 1995
- M.B.A. program ranked 20th by its peers in *U.S. News & World Report*, 1995
- 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 1st and graduate program ranked 4th in country, *U.S. News & World Report*, 1998
- MIS area ranked 1st in country by *U.S. News & World Report*, 1995
- 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.)

1997-1998 Enrollments

- 1,700 undergraduates (1,400 day; 300 evening)
- 250 M.B.A. day students
- 1,150 M.B.A. evening students
- 40 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
- 75 Ph.D.-business administration students
- 15 Ph.D.-industrial relations students

1997-1998 Placement Statistics

Average salaries of new graduates:

- B.S.B.-general—\$34,900
- B.S.B.-accounting—\$34,000
- M.B.A.—\$64,000
- 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 Center*
- Employer Education Service
- Labor Education Service

Cosponsored International Programs

- Global M.B.A. offered in partnership with International School of General Management in Bad Waldsee, Germany
- M.B.A. and M.A.I.R. student exchange in Australia, Austria, Belgium, France, Italy, Japan, Spain, Sweden, Switzerland
- Graduate summer business program with Université Jean Moulin-Lyon III in France
- Joint executive M.B.A. program with Warsaw School of Economics, Poland
- Undergraduate study abroad in Austria, Canada, Denmark, France, Hungary, Japan, Singapore, and Spain
- Undergraduate exchange program with University of Maastricht Business School, The Netherlands
- Faculty exchange programs in China, France, Japan, 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

Admission

Each year CSOM admits approximately 300 freshmen, 80 sophomores, and 40 juniors. For sophomores and juniors, college GPA, essays, and activities and achievements are key admission criteria.

Freshmen and sophomores admitted to CSOM 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

Students are automatically admitted as CSOM freshmen if they

1. submit a complete application, including all test scores and transcripts, with a \$25 application fee before the freshman class fills. Applications are available at <admissions.tc.umn.edu> on the World Wide 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).
2. complete the high school preparation requirements. See “Freshman Admission” in the General Information section of this catalog.
3. meet the ACT or SAT aptitude rating standards below. (If students do not know their high school rank, they should consult their high school counselor.)
4. apply by the December 15 priority deadline.

The formulas below 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.

Ratings for CSOM preferred admission

ACT Aptitude Rating (AAR) minimum of 135

(for students who have taken the ACT): High school rank percentile + (2 x ACT composite score)

SAT Aptitude Rating (SAR) minimum of 200

(for students who took the SAT *before April 1, 1995*): High school rank percentile + (SAT verbal ÷ 10 + SAT math ÷ 10)

RSAT Aptitude Rating (RSAR) minimum of 200

(for students who took the SAT *after April 1, 1995*): High school rank percentile + (SAT verbal ÷ 10 + SAT math ÷ 10)

Individual Review

If students do not meet these standards for automatic admission, their application is considered through an individual review process. The Office of Admissions does not rigidly adhere to an admissions formula. Individual review is a routine part of the admission process.

Admission at the Sophomore Year or Later

Standards for Admission to CSOM as Sophomores (from within the University)

A limited number of sophomores are admitted each academic year. Fall is CSOM’s primary admission term. The application deadline is March 1. If there are openings remaining for spring admission after fall admission is completed, students may apply for those openings through October 1.

For non-CSOM University freshmen to transfer to CSOM for their sophomore year, the following standards apply.

- Completion of 30-49 credits (see below for procedures for students with 50 or more credits)

- 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)
- A 3.40 overall GPA is generally needed for admission, but this GPA is subject to change. All applicants with a 2.80 minimum overall GPA are considered. Students may submit an activity résumé to support their application.

Note: Students are encouraged to apply by the March 1 deadline for fall semester admission. CSOM cannot guarantee there will be openings available spring semester.

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 (612/625-5333).

Admission to Upper Division CSOM Major Programs

The following standards apply for students transferring directly into a CSOM upper division major program.

- Completion of 50 or more 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)
- Completion of other CSOM premajor requirements (contact an adviser in 1-105 Carlson School of Management for more information)
- A 3.50 overall GPA is generally required for admission, but this GPA is subject to change depending on seats available and the strength of the applicant pool. Applicants with a 2.70 minimum overall GPA are considered. Students may submit an activity résumé to support their application.

The admission application deadline for the upper division CSOM program is March 1 for fall semester.

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 CSOM

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 CSOM 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 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.

Other Admission and Registration Options

University College

Admission and program requirements for CSOM'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 credits.

CSOM offers an extensive selection of undergraduate courses in the evening and students can complete the required coursework for many CSOM programs through University College (UC). 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 CSOM 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 Career Services Center, 1-110 Carlson School of Management.

UC offers a number of certificate programs in various business fields. These programs are described in the *University College Catalog*.

Distance Education

University of Minnesota distance education courses carrying degree credit may apply toward CSOM requirements. CSOM accepts a maximum of four 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.

Adult Special Status

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 CSOM as an adult special 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 adult special students and later decide to become degree candidates, they must satisfy CSOM's admission requirements and apply to transfer into a degree program.

Applications for admission with adult special status are available in the Office of Admissions, 240 Williamson Hall. The application deadline for adult special students is July 15 for fall semester.

Degrees

Baccalaureate Programs

A CSOM 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, insurance, international business, management information systems (MIS), marketing, and a self-designed general management major.

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

CSOM, 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 CSOM and the Institute of Technology. The program prepares experienced engineers and scientists for management roles in technology-intensive organizations. Classes are held on Fridays and Saturdays. For more information, contact the M.S.-M.O.T. Program, Center for the Development of Technological Leadership, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis MN 55455 (612/624-5747).

The Carlson Executive M.B.A. (C.E.M.B.A.) Program

This 50-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 a two-year 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).

The Carlson School's
undergraduate
programs ranked
#16 in the nation
according to *U.S.
News & World
Report*.

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 50th 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 University College. 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 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

Minors in actuarial science, entrepreneurial studies, finance, human resources and industrial relations, insurance, and international business are available to CSOM students. A general business minor is available to qualified students in the Institute of Technology. See an Undergraduate Studies Office adviser for program details.

Scholastic Standards and Policies

Academic Progress Standards for CSOM Freshmen and Sophomores

The academic progress of CSOM freshmen and sophomores is monitored every semester. Because there are GPA criteria for students to matriculate from their freshman to sophomore year and from their sophomore year to their upper division major, 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 CSOM Students

- For a CSOM 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 or waiver for 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

CSOM students must earn a minimum of 60 credits A-F.

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.

Joint Day/University College Registration—Joint day/University College registration requests for CSOM courses are considered the first day following the day school alphabetical registration queue each semester.

Repeating Courses

If students take a course and earn a D+ or D, they may repeat that course *once*, and only the second grade will be calculated into their GPA. The only exception to this policy is when students earn an F in the repeated course in which case *both* grades will count in their GPA.

Students may repeat courses in which they receive a grade of F. Both the old and new grades will remain on their record and count toward their GPA. No degree credit is granted for grades of F or N. Students need not repeat a course for which they received an F unless it is required for graduation.

More than 150 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 approximately four times each year from October through August. Contact the Undergraduate Studies Office (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.

CSOM 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 CSOM students must

- 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 10 upper division courses taught by CSOM 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 177 for lower division progress standards.)

Note: If students were previously admitted to CSOM and have not taken courses for two years or more, they should consult a CSOM adviser before continuing their coursework. Contact the Undergraduate Studies Office in 1-105 Carlson School of Management for updated degree planning sheets.

Students admitted to the 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. Students can declare one or two majors.

Advising

CSOM offers centralized advising services to undergraduates currently enrolled or interested in CSOM. In addition, CSOM also works closely with the College of Liberal Arts' prebusiness advisers (B-18 Johnston Hall, 612/624-9585).

To schedule an appointment with a CSOM academic adviser, students should call or visit 1-105 Carlson School of Management (612/624-3313). 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.

CSOM 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

Mentorship Program—CSOM 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, usually taken in the winter, emphasizes auditing and taxation. The management accounting internship, usually taken during the summer, involves areas such as developing cost data for specific projects, reviewing accounting procedures, and evaluating and 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 CSOM 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 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 on the second floor 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 Deloitte Haskins and Sells Tax Research Room is adjacent to the Business Reference Service. 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 on the fourth floor. Indexes, bibliographies, and reference assistance are also available there.

Loans and Scholarships

Several short-term loans are available to CSOM students. For more information, contact the Undergraduate Studies Office, 1-105 Carlson School of Management (612/624-3313). In addition, the Department of Accounting has a loan fund for accounting majors; contact the department directly (612/624-6506) for more information.

A variety of scholarships—both need- and merit-based—are available for current and prospective CSOM 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. In addition, the Department of Accounting annually awards many scholarships to undergraduate accounting majors; contact the department early fall semester to obtain application information. Awards are primarily based on academic merit.

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 Career Services 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 CSOM degree. Tours of local corporations, guest speakers, and social events are sponsored by BAM throughout the year. Members are actively involved in various campus and community activities.

Business Board (B-Board)—This group represents CSOM’s undergraduate student body. B-Board sets policies that govern student organizations and its members serve on various school committees and plan activities to foster interaction among students and faculty. Nonboard members are welcome to participate in all B-Board meetings and events.

The management information systems area was ranked #1 in the nation by U.S. News & World Report.

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—This program promotes the interests of CSOM 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.

Institute of Management Accountants (IMA)—The Institute of Management Accountants student chapter is officially sponsored by the IMA St. Paul chapter. Its purpose is to facilitate communication and contact with area management accounting professionals. The group offers several professional events each semester and members may participate in activities held by all three Twin Cities IMA chapters.

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.

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.

Directory

(area code 612)

Accounting and Business Law

3-310 Carlson School of Management
624-6506

Career Services 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

Industrial Relations

3-300 Carlson School of Management
624-2500 (graduate programs, 624-5810)

Employer Education Service

624-5525

Labor Education Service

624-5020

I.R. Reference Room

624-7011

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

3-140 Carlson School of Management
624-5055

Entrepreneurial Studies Center

624-5524

Logistics Management Research Center

625-0352

M.B.A. Program

2-210 Carlson School of Management
624-0006

M.B.T. Program

3-110 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

Facilities

624-3842

Financial Services

625-0086

International Program Development

4-104 Carlson School of Management
625-9361

Office of Information Technology

1-150 Carlson School of Management
625-5550

Operations and Management Sciences

3-140 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

Degree Programs

Degree Program Requirements

The following requirements apply to all CSOM 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 [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)
Information technology module (BA 1001) (2 cr, S-N only)
Introduction to business and business careers (Mgmt 2350) (4 cr, A-F only)

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)

* Must be completed before the student's first semester in CSOM. See sophomore admission requirements earlier in this section.

Upper Division Requirements

(quarter-based course number, if different, in parentheses)

- A. Functional core (2 cr each, A-F only)
- Acct 3001—Introduction to Management Accounting
 - Fina 3001 (was BFin 3000)—Finance Fundamentals
 - HRIR 3021 (was IR 3002)—Personnel and Industrial Relations
 - IDSc 3001 (was 3030)—Information Systems and Information Management
 - Mgmt 3001—Fundamentals of Management
 - Mktg 3001 (was 3000)—Principles of Marketing
 - OMS 3001 (was 3000)—Introduction to Operations Management
- B. Mgmt 4004 (was 3004)—Business Policy: Strategy Formulation and Implementation (4 cr, A-F only)
- C. International core (4 cr, A-F only) One of the following:
- Acct 5310—International Accounting
 - ApEc 3070, 5720, 5750, 5790
 - BGS 3004—International Business
 - BGS 3014—Topics in International Business
 - BGS 3040 (was BA 3040)—International Environment of Business
 - Econ 3041, 3315, 5301, 5307, 5315, 5331, 5337, 5401
 - Fina 4641 (was BFin 3400)—International Finance and Risk Management
 - Mktg 4070 (was 3072)—International Marketing
- D. Communications core (4 cr, A-F only)
- BA 3033—Business Communication

Note: Pending approval, CSOM will offer two new majors—entrepreneurial studies, and human resources and industrial relations—beginning fall 1999. For more information about these majors, contact the Undergraduate Studies Office (1-105 Carlson School of Management, 612/624-3313).

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
 - Acct 5102—Liability Valuation and Income Determination
 - Acct 5125—Auditing Principles and Procedures
 - Acct 5135—Fundamentals of Federal Income Tax
 - BLaw 3058—The Law of Contracts and Agency
- Four credits from the following:*
- Acct 5160—Financial Statement Analysis (2 cr)
 - Acct 5236—Introduction to Taxation of Business Ethics (2 cr)
 - Acct 3201—Intermediate Management Accounting (2 cr)
 - Acct 5180—Consolidations and Advanced Reporting (2 cr)
 - Acct 5126—Internal Auditing (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.

Required Courses

Ins 5101 and 5200 *or* Ins 5100 and 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 5101 and 5200 are preferred)

Math 4065

Math 5067 and 5068

Math 5101 and 5102 (preferred sequence) *or* Math 4101 and 4102 (this sequence acceptable only if students also complete a probability course)

Minor Requirements

Ins 5100—Corporate Risk Management

and Ins 5101—Employee Benefits and Pensions

or Ins 5200—Insurance Theory and Practice

and Ins 5201—Personal Financial Management.

Math 4065—Theory of Interest

or Math 5067—Actuarial Mathematics I

or Math 5068—Actuarial Mathematics II

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

Sixteen credits of additional finance coursework beyond Fina 3001

Minor Requirements

A finance minor is available to CSOM students. Any 12 credits in finance coursework (beyond Fina 3001) completes this minor.

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.

Minor Requirements

A management minor is available to Institute of Technology students. The minor consists of the following.

Prerequisites: (8 cr) Econ 1104 and 1105

(*or* Econ 1101 and 1102)

Required for all students: CSCI 2031 (4 cr);

Acct 1050 (4 cr)

Four of the following five courses (16 cr):

Acct 3001 *or* IEOR 5441; Fina 3001; Mgmt 3001; Mktg 3000;

OMS 3000

International Business

B.S.B.

CSOM'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 from 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

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.

Sufficient credits in international business (or related area) for a minimum credit total of 20 semester credits. All coursework must be international in focus.

Two college years or the equivalent of the same second language.

Language Requirements

Proficiency in a language other than English at the level of four college semesters (two years) is required.

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 one from a pool of MIS elective courses.

During the 1997-98 school year, 180 companies came to the CSOM Career Services Center to interview students. The average starting salary of B.S.B. graduates is about \$34,500.

Fundamental to success in performing MIS work is an understanding of human behavior and computer technology. Therefore, MIS majors are encouraged to take courses in psychology, sociology, and computer science as part of their overall undergraduate degree requirements.

Required Courses

IDSc 3201—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 five courses beyond the required introductory course (Mktg 3001). One course, Mktg 3010—Marketing Research, is required. Reflecting the need for some degree of uniformity in coverage and training, students select the remaining four courses from an approved list to provide the specialization needed for specific job opportunities in advertising management, sales management, logistics management, retail sales/buying, or marketing management.

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 or 5068—Actuarial Mathematics I or II (4 cr)

Minor Requirements

Ins 5100—Corporate Risk Management
Ins 5101—Employee Benefits and Pensions
Ins 5200—Insurance Theory and Practice

One of the following five courses:

Ins 5201—Personal Financial Management
BLaw 3058—The Law of Contracts and Agency
Math 4065—Theory of Interest Rates
Math 5067—Actuarial Math I
Math 5068—Actuarial Math II



Medical Technology

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Contents



Medical Technology

Medical Technology

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, 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 methodology.
- apply 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 NAACLS@mcs.net).

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, Abbott-Northwestern Hospital, and Fairview Hospital and Healthcare Services (Minneapolis); Mayo Clinic (Rochester); and the North Central Blood Services of 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, human anatomy, and physiology), as well as in the social and behavioral sciences. The division

Initiated in 1922,
the medical
technology
program was the
first in the nation to
offer a
baccalaureate
degree.

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 Department of Laboratory Medicine and Pathology of the Medical School.

Admission to 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 prerequisite completion.

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 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 GPA in prerequisite courses. Students are usually 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 May 1. Those who have sufficient credits but have course deficiencies should consult with Division of Medical Technology advisers 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 prerequisites 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* at <admissions.tc.umn.edu> on the World Wide Web or from the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008). These applications must be filed with the Office of Admissions by May 1. It is strongly advised that transfer students ascertain their status by writing to the Director, 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.).

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 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 the Boynton Health Service for necessary immunizations 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 (2.00 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.

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. Ordinarily, 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); manipulate other laboratory materials (e.g., reagents and pipettes).

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; 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.

Application skills—Must be able to apply knowledge, skills, and values learned from previous coursework and life experiences to new situations.

Certification and Placement

Division of Medical Technology graduates are eligible to take national examinations for certification as medical technologists or clinical laboratory scientists. These examinations are conducted by national certifying agencies. Many organizations/institutions require certification for employment.

Program graduates are assisted in finding employment by Division of Medical Technology advisers. 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

Pre-Health Sciences Advising—College of Liberal Arts Pre-Major Advising, 30 Johnston Hall, is a centralized resource offering a wide range of services to University students. Health sciences specialists offer academic advising services, such as assistance with course planning and registration, evaluation of coursework already completed, and information about admission requirements and application or testing procedures. Specialists also assist individuals in exploring various health care fields and careers.

A health sciences library is available in 30 Johnston Hall. It contains a collection of bulletins from schools throughout the country with health-related programs, videotapes from many health sciences schools, occupational files with information about health sciences professions, and general reference materials about health care fields.

For more information or to arrange an advising appointment, call (612) 624-9006.

Medical Technology Advising—The Division of Medical Technology offers centralized advising services to undergraduates currently enrolled or interested in medical technology. In addition, medical technology advisers work 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'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 minority pre-health sciences student organization. Advising and special courses are also offered through the Martin Luther King Program.

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

The medical
technology program
holds the only
endowed
professorship in
medical technology
in the United States.

Scholarships

The Division of Medical Technology has four scholarship programs for students in the professional program. Awards are made 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 following career paths list 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, and education.

Hospital/Medical Center: Laboratory Areas

- 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
- 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 laboratory
- Tissue typing
- Transplant services
- Virology

Health Care Agency/Government

- Administrator for Veterans Affairs hospital
- Biometrist in a government health agency
- 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)

Health Care Administration

- Clinic manager
- Coder—Abstractor (business or medical records office)
- Consultant service specialist
- Personnel director
- Emergency medical services coordinator
- Financial manager
- 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)

Management Information System

- Biometrician
- Director—Division of Biometry
- Installer/Educator
- Systems analyst
- Programmer

Health Maintenance Organization

- Laboratory supervisor or administrator
- Consultant to Physician Office Laboratories
- Reference/Independent/Commercial Laboratory Scientist
- Veterinary Medicine Laboratory Scientist

Humanitarian Work

- Medical missionary work
- Peace Corps
- Project HOPE, others

Education

- 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

Other Professional Routes

- Accounting
- Dentistry
- Health radiation science

Law (e.g., patent attorney)
Legislature—Politician, lobbyist, regulations writer
Medical Physics/Engineering
Medicine
Optometry
Public health
Veterinary medicine

Industry (U.S. or International)

Adviser to or inventor of “home” or other lab tests
Biomedical specialist—Occupational health
Cell culture consultant
Computer consultant
Director of marketing
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 director
Research scientist
Risk management representative—Insurance
Salesperson
Technical representative

Research—Basic and Applied

Research assistant
Associate scientist/Scientist
Director of research

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 or preprofessional 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

Karen Karni or 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).



Medical Technology

Degree Program

B.S.

Admission Requirements—Prerequisite courses include composition, general biology, mathematics (college algebra or calculus), general inorganic chemistry, human anatomy, organic chemistry with laboratory, and physics.

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” in the Policies section of this catalog). Junior courses include biochemistry, physiology, 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 recommended courses must be taken A-F.

Required Courses

Preprofessional Program

Biol 1009—General Biology
CBN 3001—Human Anatomy (with lab)
Chem 1021-1022—Chemical Principles I-II
Chem 2301-2302—Organic Chemistry I-II
Chem 2311—Organic Chemistry Lab
EngC 1011—University Writing and Critical Reading
Phys 1101—Fundamental Physics I (a higher-level course is permitted)
Two from Math 1031, 1142, 1155, 1271, 1272, Stat 3011

Professional Program

Year 3

Biol 4003—Genetics
or GCB 3022—Genetics
BioC 4001—Biochemistry
BioC 4002—Biochemistry of Physiological Processes
Phsl 3051—Human Physiology
EngC 3027—Advanced Expository Writing
VPB 2032—General Microbiology With Laboratory

Year 4

MedT 4010—Introduction to Clinical Laboratory Science
MedT 4064—Introduction to Clinical Immunohematology
MedT 4065—Introduction to Clinical Immunohematology: Laboratory
MedT 4080—Seminar: Specialty Rotations
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 4084—Applied Clinical Virology
MedT 4085—Applied Clinical Hematology
MedT 4086—Applied Clinical Immunohematology
MedT 4088—Applied Diagnostic Microbiology
MedT 4089—Specialty Rotation

Electives—Recommended courses

LaMP 4177—Pathology for Allied Health Students
MedT 1010—Orientation in Medical Technology (S-N)
MicB 4131—Immunology
Phys 1102—Fundamental Physics II
Phar 1002—Health Sciences Terminology

Final Project

After completing two semesters of professional coursework, students spend 23 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, one week in virology, and one week in a specialty laboratory area such as molecular diagnostics. The senior year also includes a capstone course in management and education.

Mortuary Science

This is the Mortuary Science section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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Contents



Mortuary Science

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.

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 the Policies section 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.

**Prerequisites for enrolling in microbiology and anatomy at different colleges and universities may vary.*

The Program of Mortuary Science is the only program in the world housed in a medical school at a major research institution.

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.

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 196.

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). 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

To complete the B.S., students must complete at least 120 credits, 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—Issues of Loss, Grief, and Bereavement (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

CNR

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, the Engineering and Fisheries Laboratory, and the Natural Resources Science Building 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, the Entomology, Fisheries, and Wildlife Library, laboratories, and lecture and faculty facilities are in Hodson Hall and the Engineering and Fisheries Laboratory. Adjacent to college facilities is the regional headquarters of the North Central Research Station of the U.S. Forest Service.

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 Offices, 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 in 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):

$$\text{HSR percentile} + (\text{SAT verbal} \div 10 + \text{SAT math} \div 10) = 170$$

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 University College 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: (1) fisheries and wildlife (with specializations in fisheries, wildlife, and conservation biology); (2) forest resources (with tracks in forest management and forest science); (3) 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); (4) recreation resource management; (5) urban forestry; and (6) 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, or wildlife conservation, water resource science, conservation biology, and the master of forestry (M.F.) degrees are offered through the Graduate School in cooperation with CNR. For detailed 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 leads 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 minor concentrations designed to enhance the major programs of current natural resources students as well as those whose major programs are unrelated to natural resources. CNR minors include fisheries and wildlife, forest resources, urban forestry, and paper science and engineering. Students may apply for a minor in any University department or program that offers such an option. 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 have the opportunity to participate in honors at both the lower division (freshman/sophomore) and upper division (junior/senior) levels. At the lower division level, students participate in specially designed honors courses and honors colloquia focusing on current issues in their chosen field of study. 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. The upper division honors experience 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 3000. 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 minimum cumulative GPA of 3.30, with at least 60 semester credits completed (After admission, students must achieve a cumulative GPA of 3.50 to graduate with honors.)

Application Procedure for Upper Division

Applicants—Students must complete an upper division honors application with a faculty mentor's 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 cum laude, magna cum laude, and 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. Courses are FW 4801, 4802; FR 4801, 4802; NRES 4801, 4802; and WPS 4801, 4802.

- 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 3.50 GPA);

Magna cum laude (minimum 3.66 GPA);

Summa cum laude (minimum 3.75 GPA).

Students also receive the appropriate 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 from 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, students must be a current CNR student and have completed 12 credits with at least a 3.67 GPA. Dean's List recipients receive a letter from the dean recognizing their academic accomplishments and are recognized 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 waive an academic policy or curricular requirement, provided the basic spirit of the regulation is maintained. A student may petition for a departure from normal procedure. Students must first receive major adviser/departmental recommendation before the petition is routed to the Student Scholastic Standing Committee.

Repeating Courses—Students may repeat a course even if a passing grade was received. The grade received for the course the second time becomes the permanent grade. The original grade and credits are not included in the student's cumulative number of completed credits or

GPA. It is the student's responsibility to report any repeated courses to the CNR Student Services Office.

Special Examinations for Credit—Students who believe their knowledge of a subject is equal to that required to complete a particular course may request to take an examination for credit. If the Student Scholastic Standing Committee and the department approve, arrangements can be made with an appropriate instructor to take an examination. Usually no grade is assigned. A fee is assessed for each examination. Credit by special examination is not granted for language or mathematics courses taken in high school.

Suspension—To appeal a suspension (see "Probation" 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 are 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.

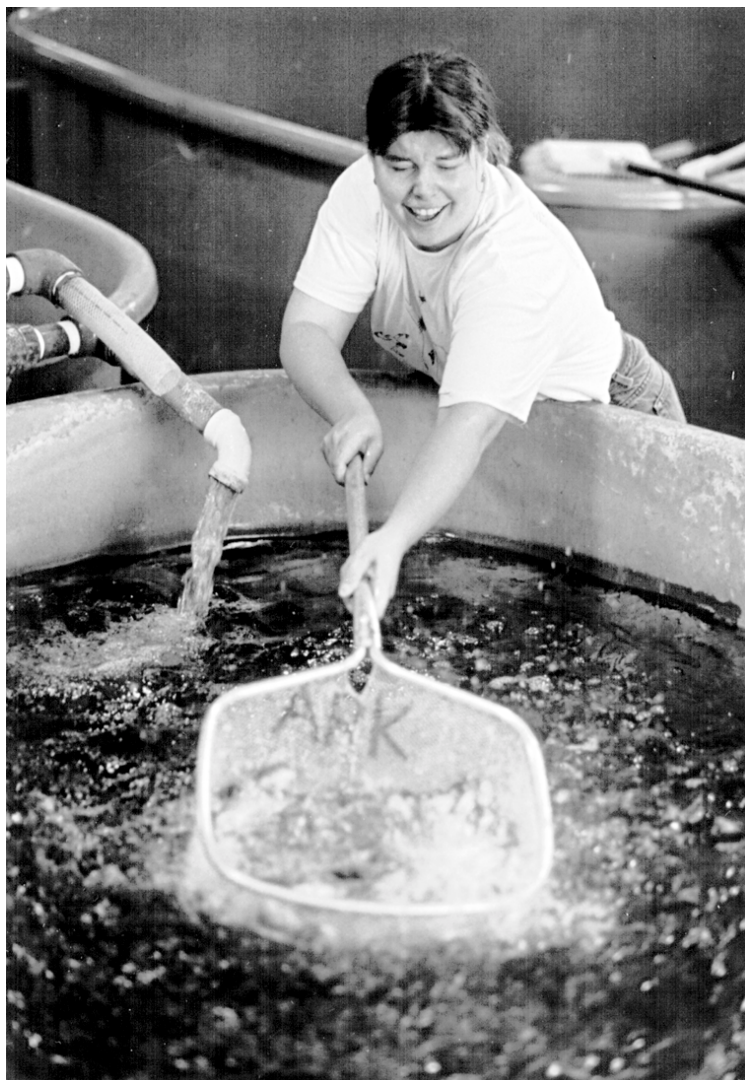
Itasca Session—Forest resources, urban forestry, and fisheries and wildlife majors are required to complete a three-week summer field session at the Lake Itasca Forestry and Biological Station. To attend, students must have completed 30 semester credits and attained a minimum cumulative GPA of 2.00. Forest resources and urban forestry students must also have completed the following courses with a grade of C- or better: Biol 2022, Chem 1011 or 1021, and precalculus or college algebra. Fisheries and wildlife students must have completed the following courses with a grade of C- or better: Biol 1009, 2022, 2012, and 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 at least 6 credits of biology. 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 minimum cumulative GPA of 2.00 and complete the Itasca Session and other prerequisites. This is a five-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 departmental 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 spring break of 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.

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 contact 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 departmental faculty. A series of special employment seminars are provided by the Career Services Office on topics including resume writing, interviewing, initiating internship job searches, and summer/seasonal intern hiring updates. Each major also requires an orientation class for incoming students 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, and campus levels. Within each department, several committees (including curriculum committees) have student representatives. Students serve on CNR committees and on the college'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.

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, and 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

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 below. 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 (3 cr)

or EngC 3027—Advanced Expository Writing (3 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 (3 cr)

FW 4001—Biometry (4 cr)

or Stat 5021—Statistical Analysis (4 cr)

Physical, Chemical, and Biological Sciences

Chem 1021—Chemical Principles I (4 cr)

Chem 1022—Chemical Principles II (4 cr)

Biol 2012—General Zoology (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

FW 1001—Orientation in Fisheries, Wildlife, and Conservation Biology (1 cr)

Biol 3407—Ecology (3 cr)

NRES 3011—Ethics, Conflict and Leadership in Resource Management (3 cr)

FW 4701—Fisheries and Wildlife Problem Solving (2 cr)

or FW 4801—Honors Research (2 cr)

and FW 4802—Honors Research (2 cr)

and FW 4200—Honors Seminar (1 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 4003—Human Dimensions of Wildlife Management (3 cr)

NRES 3241—Natural Resources Policy and Administration (3 cr)

NRES 3202—Planning and Leadership in Natural Resource Management (3 cr)

Animals and Plants

Select one plant and one animal course:

FW 4129—Mammalogy (4 cr)

EEB 4134—Introduction to Ornithology (4 cr)

FW 4136—Ichthyology (4 cr)

Ent 5021—Insect Taxonomy and Phylogeny (4 cr)

FR 1101—Dendrology (3 cr)

PBio 4511—Plant Systematics (3 cr)

PBio 4321—Taxonomy of Minnesota Flora (3 cr)

The 1998 Gourman Report ranked the fisheries and wildlife program #5 in the nation.

Community and Ecosystem Ecology

LA 5204—Landscape Ecology (3 cr)

Select one of the following:

FR 5142—Tropical Forest Ecology (3 cr)

EEB 4014—Ecology of Vegetation (3 cr)

EEB 4016—Ecological Biogeography (3 cr)

EEB 4601—Limnology (3 cr)

EEB 4608—Ecosystem Ecology (3 cr)

EEB 5122—Plant Interactions with Animals and Microbes (4 cr)

Fisheries, Wildlife, and Conservation Biology

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

Select one of the following:

FW 5601—Fisheries Analysis (3 cr)

FW 5051—Analysis of Populations (3 cr)

FW 5604—Fisheries Ecology and Management (3 cr)

FW 5603—Habitats and Regulation of Wildlife (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—Please give strong consideration to courses on the list below or in any of the three areas of specialization (i.e., fisheries, wildlife, or conservation biology).

FW 5621—GIS for Fisheries, Wildlife, and Biological Conservation (3 cr)

or FR 4131—GIS in Natural Resource Analysis (3 cr)

NRES 3575—Wetlands 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 3061—Water Quality: Management of a Natural Resource (3 cr)

NRES 4211—Survey, Measurement, and Modeling in Natural Resources (3 cr)

NRES 4801—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 4003—Human Dimensions of Wildlife Management (3 cr)

NRES 3241—Natural Resources Policy and Administration (3 cr)

NRES 3202—Planning and Leadership in Natural Resource Management (3 cr)

Animals and Plants

FW 4136—Ichthyology (4 cr)

FW 4401—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:

PBio 1501—Minnesota Plant Life (2 cr)

PBio 4511—Plant Systematics (3 cr)

Ent 5361—Aquatic Insects (3 cr)

Ent 5021—Insect Taxonomy and Phylogeny (4 cr)

Community and Ecosystem Ecology

EEB 4601—Limnology (3 cr)

Select one of the following:

EEB 5052—Ecology: Theory and Concepts (4 cr)

EEB 4607—Plankton Ecology (4 cr)

EEB 4608—Ecosystems Ecology (3 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 5604—Fisheries Ecology and Management (3 cr)

FW 5603—Habitats and Regulation of Wildlife (3 cr)

or FW 4129—Mammalogy (4 cr)

or EEB 4134—Introduction to Ornithology (4 cr)

Select one of the following:

Chem 2101—Introductory Analytical Chemistry Lecture (3 cr)

and Chem 2111—Introductory Analytical Chemistry Lab (1 cr)

or Chem 2301—Organic Chemistry I (3 cr)

and Chem 2311—Organic Chemistry Lab (3 cr)

Electives—Please give strong consideration to courses on the list below or in any of the three areas of specialization (i.e., fisheries, wildlife or conservation biology).

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 3061—Water Quality: Management of a Natural Resource (3 cr)

NRES 4801—Natural Resources Interpretation (3 cr)

NRES 5002—Colloquium: Restoration of Aquatic Systems (1 cr)

EEB 3111—Introduction to Animal Behavior (3 cr)

EEB 4621—Limnology Laboratory (1 cr)

FR 4114—Forest Hydrology and Watershed Management (3 cr)

BioC 1012—General Principles of Biochemistry (3 cr)

Wildlife Specialization

The wildlife area of specialization is for students who wish to pursue careers in wildlife science, management, and administration, zoo biology, and 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 4003—Human Dimensions of Wildlife Management (3 cr)

NRES 3241—Natural Resources Policy and Administration (3 cr)

NRES 3202—Planning and Leadership in Natural Resource Management (3 cr)

Animals and Plants

FW 4129—Mammalogy (4 cr)

EEB 4134—Introduction to Ornithology (4 cr)

FW 4401—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 5052—Ecology: Theory and Concepts (4 cr)

EEB 4601—Limnology (3 cr)

EEB 4608—Ecosystem Ecology (3 cr)

FR 5142—Tropical Forest Ecology (3 cr)

Fisheries and Wildlife

Forest Resources

The 1998 Gourman Report ranked the forest resources program #1 in the nation.

Select one of the following:

- LA 5204—Landscape Ecology (3 cr)
- EEB 4014—Ecology of Vegetation (3 cr)
- EEB 4016—Ecological Biogeography (3 cr)
- EEB 5122—Plant Interactions with Animals and Microbes (4 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 5603—Habitats and Regulation of Wildlife (3 cr)
- FW 5604—Fisheries Ecology and Management (3 cr)
- or FW 4136—Ichthyology (3 cr)
- or FW 5455—Sustainable Aquaculture (3 cr)

Electives—Please give strong consideration to courses on the list below or in any of the three areas of specialization (i.e., fisheries, wildlife, or conservation biology).

- 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)
- FR 4411—Silviculture Systems (3 cr)
- or NRES 3021—Plant Resource Management and the Environment (3 cr)
- FR 4114—Forest Hydrology and Watershed Management (3 cr)
- FR 4232—Management of Recreational Lands (4 cr)
- FR 4262—Remote Sensing of Natural Resources (3 cr)
- NRES 3575—Wetlands Conservation (3 cr)
- NRES 4211—Survey, Measurement, and Modeling in Natural Resources (3 cr)
- NRES 3002—Colloquium: Exotic Species (2 cr)
- EEB 3111—Introduction to Animal Behavior (3 cr)
- EEB 5033—Population and Quantitative Genetics (4 cr)
- Biol 3409—Evolution (3 cr)
- Ent 5041—Insect Ecology (3 cr)
- Hort 5071—Restoration and Reclamation Ecology (3 cr)
- Stat 5303—Designing Experiments (4 cr)
- BioC 1012—General Principles of Biochemistry (3 cr)
- PBio 4321—Taxonomy of Minnesota Flora (3 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 of fish and wildlife biology and natural history and the general principles applied to managing their populations and habitats is provided. Students interested in the minor should contact the CNR Office of Student Services. A total of 23-25 credits are required among 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 Courses

- 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 5603—Habitats and Regulation of Wildlife (3 cr)
- FW 5604—Fisheries Ecology and Management (3 cr)

Select one of the following:

- FW 4129—Mammalogy (4 cr)
- FW 4136—Ichthyology (4 cr)
- EEB 4134—Introduction to Ornithology (4 cr)

Select one of the following:

- FW 4401—Introduction to Fish Physiology and Behavior (4 cr)
- FW 5571—Avian Conservation (3 cr)
- FW 5601—Fisheries Analysis (3 cr)
- FW 5051—Analysis of Populations (3 cr)
- FW 5455—Sustainable Aquaculture (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 minimum requirements for admission to colleges of veterinary medicine 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.

- Phys 1101 and 1102— (4 cr, 4 cr)
- or Phys 1201 and 1202— (5 cr, 5 cr)
- or Phys 1301 and 1302— (4 cr, 4 cr)
- Chem 2301—Organic Chemistry I (3 cr)
- Chem 2311—Organic Chemistry Lab I (3 cr)
- Chem 2302—Organic Chemistry II (3 cr)
- VPB 2032—General Microbiology with Lab (4 cr)
- or Biol 3301—Biology of Microorganisms (5 cr)
- BioC 3021—Biochemistry (3 cr)

Forest Resources

Department of Forest Resources

B.S.

The forest resources curriculum prepares students to plan, implement, and research the management, protection, and sustainable use of forest and related resources, including timber, water, wildlife, recreation, and aesthetics. Students in the forest resources curriculum select between two tracks, forest management and forest science. Both tracks qualify students to be forest managers. However, students taking the forest management track receive more training in principles and techniques of resource management, while those 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 in their college careers as possible.

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)
- or Spch 1101—Introduction to Public Speaking (3 cr)

Rhet 1223—Oral Presentation in a Professional Settings (3 cr)
Rhet 3562—Technical and Professional Writing (3 cr)
or EngC 3027—Advanced Expository Writing (4 cr)
or Spch 1101—Introduction to Public Speaking (3 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)
Physics 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)

Social Sciences and Humanities (15 cr)

ApEc 1101—Principles of Microeconomics (3 cr)
or Econ 1101—Principles of Microeconomics (4 cr)
NRES 3261—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 4262—Remote Sensing of Natural Resources (3 cr)
FR 4218—Assessment and Modeling of Forests (3 cr)

Management of Vegetation, Wildlife, Soil, and Water Resources:

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)
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)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr) (recommended for freshmen or sophomores)
or FW 5603—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 3241—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. This track contains a forest harvesting option that involves a year of study at the University of Idaho.

Required Mathematics and Chemistry Courses

Math 1142—Short Calculus (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)

Additional Forest Management Professional Courses

FR 4431—Timber Harvesting and Road Planning (1 cr)
FR 4232—Management of Recreational Lands (4 cr)
NRES 3202—Planning and Leadership in Natural Resource Management (3 cr)
or NRES 3011—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 4615—Remote Sensing and Resource Assessment: Field Applications (2 cr)
FR 4611—Field Silviculture (3 cr)
FR 4621—Timber Harvesting and Road Planning: Field Applications (2 cr)

Enrichment Courses

Students select, with adviser approval, 10 additional credits of professional courses, which are grouped below by subject matter. At least 7 of the credits must be taken 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 may not be used to fill the 10 credit enrichment requirement if they are used to satisfy other requirements.

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 5603—Habitats and Regulation of Wildlife (3 cr)
FW 5604—Fisheries Ecology and Management (3 cr)
Geo 1001—The Dynamic Earth: An Introduction to Geology (4 cr)
NRES 3061—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 3202—Planning and Leadership in Natural Resource Management (3 cr)
or NRES 3011—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)

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 within the forest management track. This option 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, and 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 this option must consult Professor Charlie Blinn.

Course requirements for this option are those in the general forest management track with the following exceptions.

Natural resources
management was
ranked #7 in the
nation by the 1998
Gourman Report.

Required Courses

14 semester credits of forest harvesting courses taught at the University of Idaho. A current list of these courses can be obtained from Professor Blinn.

Course Requirements Omitted in 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)
- PIPa 3033—Diseases of Forest and Shade Trees (3 cr)
- FR 4471—Forest Management and Planning (3 cr)
- FR 4232—Management of Recreational Lands (4 cr)
- NRES 3202—Planning and Leadership in Natural Resource Management (3 cr)
- or NRES 3011—Ethics, Conflict, and Leadership in Resource Management (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 Mathematics and Chemistry Courses

- Math 1271—Calculus I (4 cr)
- Math 1272—Calculus II (4 cr)
- Chem 1021—Chemical Principles I (4 cr)
- Chem 1022—Chemical Principles II (4 cr)

Additional 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 Requirements

The forest resources minor (17 cr) helps students in natural resources and other areas gain deeper understanding of the scientific foundations of forestry, the management of forest resources, and the importance of forest resources to society. Students select from an array of courses in forest assessment, forest biology and management, and forest economics and policy. Students may include a three-week hands-on field session in Itasca State Park as part of their minor. Students interested in the minor should contact the CNR Student Services Office.

Minor Core Courses (10-11 cr)

- 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:

- NRES 3241—Natural Resource Policy and Administration (3 cr)
- NRES 3261—Economics and Natural Resource Management (3 cr)
- NRES 4232—Management of Recreational Lands (3 cr)
- FR 4501—Urban Forest Management (3 cr)
- FR 4471—Forest Management and Planning (3 cr)

Resource Assessment

- FR 4218—Assessment and Modeling of Forests (3 cr)
- FR 4131—Geographic Information Systems for Natural Resource Analysis (3 cr)
- FR 4262—Remote Sensing of Natural Resources (3 cr)

Biology and Management of Vegetation, Wildlife, Water, and Soil 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 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)
- Ent 3001—Insects and Insect Management (1 cr)
- and Ent 4251—Forest and Shade Tree Entomology (2 cr)
- PIPa 3003—Diseases of Forest and Shade Trees (3 cr)
- NRES 4703—Agroforestry: Role in Watershed Management (3 cr)

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 have flexibility in designing their study program to 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 on the following page. 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 Rhet 1102—Writing on Issues of Science and Technology (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 (3 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)

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 3261—Economics and Natural Resource Management

- or NRES 3241—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.

CNR Core Courses

- NRES 1001—Orientation and Information Systems (1 cr)
NRES 1201—Conservation of Natural Resources (3 cr)
NRES 3000 or 3001 or 3002 or 5001—Colloquium (choose one) (1-2 cr)
FR 3104—Forest Ecology (4 cr)
or Biol 3407—Ecology (3 cr)
NRES 3061—Water Quality: Management of a Natural Resource (3 cr)
or FR 4114—Forest Hydrology and Watershed Management (3 cr)
FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 4411—Silviculture Systems (3 cr)
NRES 4211—Survey, Measurement, and Modeling in Natural Resources (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 4195—Problem Solving in Natural Resources and Environmental Studies (4 cr)
or NRES 4295—GIS for Problem Solving in Environmental Science and Management (4 cr)

Environmental Assessment and Monitoring Concentration

The environmental assessment and monitoring concentration focuses on development of skills for assessing the extent and character of various natural and environmental resources with techniques such as geographic information systems, remote sensing, and quantitative sampling, analysis, and modeling.

Required Courses

General Education and Professional Course Requirements

- Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
- Chem 1021—Chemistry Principles I (4 cr)
and Chem 1022—Chemistry Principles II (4 cr)
or Chem 1011—General Principles of Chemistry (4 cr)
and BioC 1012—General Principles of Biochemistry (3 cr)
- Phys 1001—The Physical World—Energy and Its Impact on the Environment (4 cr)
or “B” or better in high school physics
- FR 4131—Geographical Information Systems for Natural Resource Analysis (3 cr)
- FR 4262—Remote Sensing of Natural Resources (3 cr)
- NRES 4295—GIS for Problem Solving in Environmental Science and Management (4 cr)
- FR 2101, 2102, 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 4014—Ecology of Vegetation (3 cr)
or PBio 4321—Taxonomy of Minnesota Flora (3 cr)

Additional Required Professional Courses (12 cr)

(Courses taken from this list may not be counted toward fulfilling both core and concentration requirements)

- CSci 1113—Introduction to Programming (3 cr)
EEB 4014—Ecology of Vegetation (3 cr)
FR 2101, 2102, 2104—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Itasca) (4 cr)
FR 1101—Dendrology (3 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 5603—Habitats and Regulation of Wildlife (3 cr)
FW 5604—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 1041—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 3061—Water Quality: Management of a Natural Resource (3 cr)
NRES 3241—Natural Resource Policy and Administration (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 3261—Economics and Natural Resources Management (3 cr)
PBio 4321—Taxonomy of Minnesota Flora (3 cr)
Soil 4021—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 nonformal settings.

Required Courses

General Education and Professional Course Requirements

- Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
 Chem 1011—General Principles of Chemistry (4 cr)
or BioC 1012—General Principles of Biochemistry (3 cr)
 Phys 1001—The Physical World - Energy and Its Impact on the Environment (4 cr)
or “B” or better in high school physics
 NRES 1041—Natural Resources as Raw Materials (3 cr)
 NRES 3202—Planning and Leadership in Natural Resource Management (3 cr)
or NRES 3011—Ethics, Conflict, and Leadership in Resource Management (3 cr)



- NRES 3241—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)
 FR 5403—Fundamentals of Natural Resource Education (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, 2102, 2103—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Itasca) (4 cr)

Additional Required Professional Courses (15 cr)

- Agro 4103—World Food Problems (3 cr)
 ApEc 4611—Resource Development and Environmental Economics (3 cr)
 Anth 3041—Ecological Anthropology (3 cr)
 CI 5747—Global and Environmental Education: Content and Practice (3 cr)
 CI 5537—Special Topics: Science Education (1-8 cr)
 CI 5502—Special Topics: Outdoor Science Education (1-8 cr)
 CI 5140—Reflective Teaching and Professional Ethics (3 cr)
 CI 5533—Studies in Science Education (4 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)
 NRES 3261—Economics and Natural Resource Management (3 cr)
 NRES 3575—Wetlands Conservation (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)
 NRES 4101—Conservation of Plant 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)
 Spch 5451—Intercultural Communication Processes (3 cr)

Planning, Policy, and Law Concentration

The planning, policy, and law concentration focuses on planning and management activities, with emphases on environmental, social, and cultural factors. Application areas encompass watershed, landscape, and site planning, and address issues of development, resource protection, land use, and regulation at local, state, and national levels. Students are urged to select either a subspecialty in planning or one in policy and law.

Required Courses

General Education and Professional Course Requirements

- Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
 Chem 1011—General Principles of Chemistry (4 cr)
or BioC 1012—General Principles of Biochemistry (3 cr)
 Pol 1001—American Democracy in a Changing World (4 cr)
 LA 1401—The Designed Environment (3 cr)
 NRES 1041—Natural Resources as Raw Materials (3 cr)
 NRES 3011—Ethics, Conflict, and Leadership in Natural Resource Management (3 cr)
or NRES 3202—Planning 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, 2102, 2103—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Itasca) (4 cr ea)

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

Additional Required 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 one course must be chosen from each group.

Social Context for Planning

FR 4232—Management of Recreational Lands (4 cr)
ApEc 5321—Regional Economic Analysis (3 cr)
PA 5034—Community Analysis and Planning Techniques (1.5 cr)
PA 5251—Strategic Planning and Management (1.5 cr)
PA 5252—Strategy and Tactics in Project Planning and Management (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 4021—Environmental Impact Statements (3 cr)

Ways of Understanding and Mitigating Natural Resource Conflict

NRES 3241—Natural Resource Policy and Administration (3 cr)
NRES 3261—Economics and Natural Resources Management (3 cr)
FR 4259—Analysis of Outdoor Recreation Behavior (3 cr)
Geog 3355—Environmental Quality (4 cr)
Geog 5724—Meanings of Place (3 cr)
ApEc 4311—Tourism Development Principles, Processes and Policies (3 cr)
Rhet 3266—Group Process, Team Building, and Leadership (3 cr)
PA 5011—Organizational Analysis, Management and Design (3 cr)

Policy and Law Track in the Planning, Policy, and Law Concentration

Additional Required Professional Courses (6 cr)

NRES 3241—Natural Resource Policy and Administration (3 cr)
NRES 3261—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

Pol 3051—Power and Choice: Who Gets What, When, and Why (3 cr)
Pol 3085—Quantitative Analysis in Political Science (4 cr)
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)

Policy and Economics

ApEc 3001—Applied Micro: Consumers and Markets (3 cr)
ApEc 3006—Applied Macro: Government and the Economy (3 cr)
ApEc 5611—Land and Water Economics (3 cr)
ApEc 4311—Tourism Development Principles, Processes, and Policies (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)

Implications of Policy on Natural Resources Planning and Management

PA 5012—The Politics of Public Affairs (3 cr)
Anth 3041—Ecological Anthropology (3 cr)
Geog 5724—Meanings of Place (3 cr)
Pol 3441—Politics of Environmental Protection (3 cr)
Pol 3872—Global Environmental Cooperation (3 cr)
Pol 4483—Grassroots Politics (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)

Resource Conservation and Environmental Management Concentration

The resource conservation and environmental management 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 levels.

Required Courses

General Education and Professional Course Requirements

Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
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)
Phys 1001—The Physical World - Energy and Its Impact on the Environment (4 cr)
or “B” or better in high school physics
NRES 1041—Natural Resources as Raw Materials (3 cr)
NRES 3011—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 (3 cr)
or FR 2101, 2102, 2103—Forest Plants; Forest Ecology: Field Experience; and Forest Measurement Techniques (Itasca) (4 cr ea)
NRES 3241—Natural Resource Policy and Administration (3 cr)
NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
NRES 3261—Economics and Natural Resources Management (3 cr)

Additional Required Professional Courses

At least 15 credits required from the following list. With adviser approval, up to 4 credits not included in the list below 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 4232—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 5603—Habitats and Regulation of Wildlife (3 cr)
FW 5604—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 3361—Land Use, Landscapes, and the Law (3 cr)
Hort 5071—Landscape and Reclamation Ecology (3 cr)
LA 5204—Landscape Ecology (3 cr)
NRES 3202—Planning and Leadership in Natural Resource Management (3 cr)
NRES 3575—Wetlands Conservation (3 cr)

Natural Resources and Environmental Studies

Recreation Resource Management

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 3872—Global Environment Cooperation (3 cr)
Pol 4523—Politics of the Regulatory Process (3 cr)
Pol 5872—Global Environmental Politics (3 cr)
PubH 5200—Environmental Health (2 cr)
PubH 5173—Hazard-Related Exposure to Physical Agents in the Environment (4 cr)
Soil 3221—Soil Conservation and Land-Use Management (3 cr)
Soil 4021—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 information about solid waste management course offerings, 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

The water and soil resources concentration focuses on the management of water and soil resources to achieve a balance between management practices and resulting water or soil quality. The concentration emphasizes 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 Course Requirements

Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 cr)
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)
Phys 1001—The Physical World—Energy and Its Impact on the Environment (4 cr)
or Phys 1011—Fundamental Physics (4 cr)
EEB 4601—Limnology (3 cr)
FR 4114—Forest Hydrology and Watershed Management (3 cr)
NRES 3061—Water Quality: Management of a Natural Resource (3 cr)
WRS 5001—Field Methods in Water Resources (3 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:

AgEt 4223—Hydrology and Water Quality (3 cr)

EEB 4605—Limnology Laboratory (1 cr)
EEB 4607—Plankton Ecology (4 cr)
EEB 4609—Ecosystem Ecology (3 cr)
Ent 5361—Aquatic Insects (3 cr)
FR 4461—Water Quality: The International Dimension (3 cr)
FR 4131—GIS for Natural Resource Management (3 cr)
FR 5153—Forest and Wetland Hydrology (3 cr)
FW 5411—Aquatic Toxicology (3 cr)
FW 5604—Fisheries Ecology and Management (3 cr)
NRES 3261—Economics and Natural Resource Management (3 cr)
NRES 5002—Colloquium—Restoration of Aquatic Ecosystems (1 cr)
NRES 5575—Wetlands Conservation (3 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 Course Requirements

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)
Math 1271/1272—Calculus I and II (4 cr ea)
Math 2243—Linear Algebra and Differential Equations (3 cr)
Physics 1201/1202—General Physics I and II (5 cr ea)
or Physics 1101/1102—Fundamental Physics I and II (4 cr ea)
CE 3502—Fluid Mechanics (3 cr)
Geo 5701—General Hydrogeology
FR 4114—Forest Hydrology and Watershed Management (3 cr)
NRES 3061—Water Quality: Management of a Natural Resource (3 cr)
or CE 4541—Environmental Water Chemistry (4 cr)
WRS 5001—Field Methods in Water Resources (3 cr)
WRS 5101—Water Resources: Individuals and Institutions (3 cr)
or NRES 3241—Natural Resource Policy and Administration (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 Course Requirements

Math 1142—Short Calculus (3 cr)
or Math 1271—Calculus I (4 cr)
and Math 1272—Calculus II (4 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)
Phys 1001—The Physical World: Energy and Its Impact on the Environment (4 cr)
or “B” or better in high school physics
FR 4114—Forest Hydrology and Watershed Management (3 cr)
or NRES 3061—Water Quality: Management of a Natural Resource (3 cr)

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.

NRES 3261—Economics and Natural Resource Economics (3 cr)
 FR 4131—Geographic Information Systems for Natural Resource Analysis (3 cr)
 FR 4262—Remote Sensing in Natural Resources (3 cr)
 WRS 5101—Water Resources: Individuals and Institutions (3 cr)
or NRES 3241—Natural Resource Policy and Administration (3 cr)
 WRS 5001—Field Methods in Water Resources (3 cr)
or NRES 3051—Experience and Training in a Field Setting (1-3 cr)
or NRES 3205—Field Ecology in NRES (3 cr)
 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)

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 nonurban 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 (9-10 cr)

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 Rhet 1101 or are in an honors program should elect to 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 (3 cr)
or EngC 3027—Advanced Expository Writing (4 cr)

Mathematical Thinking (7 cr)

Math 1142—Short Calculus (3 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 (19 cr)

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

History and Social Sciences (12-14 cr):

ApEc 1101—Principles of Microeconomics (3 cr)
 ApEc 1102—Principles of Macroeconomics (3 cr)
or NRES 3261—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 (5 cr)
 Humanities—One course in literature and LA 1401—The Designed Environment (3 cr) (total 7 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.

Required Professional Courses

Introductory and General

FR 1001—Orientation and Information Systems (1 cr)
or NRES 1001—Orientation and Information Systems (1 cr)

Resource Assessment

NRES 4211—Survey, Measurements and Modeling in Natural Resources (3 cr)

FR 4131—GIS for Natural Resources Analysis (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 3061—Water Quality: Management of a Natural Resource (3 cr)
 NRES 3021—Plant Resource Management and the Environment (3 cr)
or FR 4411—Silviculture Systems (3 cr)
 FW 2001—Introduction to Fisheries, Wildlife, and Conservation Biology (3 cr)
or NRES 4101—Conservation of Plant Biodiversity (3 cr)

Policy, Management, and Planning

FR 4232—Management of Recreational Lands (4 cr)
 NRES 3245—Recreation Policy and Landscape-level Planning (3 cr)
 FR 4259—Analysis of Outdoor Recreation Behavior (3 cr)
 NRES 3011—Ethics, Conflict and Leadership in Resource Management (3 cr)
 NRES 3202—Planning and Leadership in Natural Resource Management (3 cr)
 NRES 4195—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

ApEc 4311—Tourism Development Principles, Processes, Policies (3 cr)
 Anth 3041—Ecological Anthropology (3 cr)
 Geog 5724—The Meaning of Place (3 cr)

Rhet 3266—Group Process, Team Building and Leadership (3 cr)
 Geog 3361—Land Use, Landscapes, and the Law (3 cr)
 NRES 3241—Natural Resource Policy and Administration (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)

The Department of
Wood and Paper
Science offers a one-
week tour of the
Great Lakes states
industries during
intersession.

Management of Vegetation, Soil, and Water Resources

- LA 5204—Landscape Ecology (3 cr)
Hort 4021—Landscape Design, Implementation, and Management I (4 cr)
FR 4262—Remote Sensing of Natural Resources (3 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)
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 3562—Technical and Professional Writing (3 cr)
or EngC 3027—Advanced Expository Writing (4 cr)
Rhet 3266—Group Process, Team Building and Leadership (3 cr)

Mathematical Thinking

- Math 1142—Short Calculus (3 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)

- Soil 1125—The Soil Resource (4 cr)
or Soil 2125—Basic Soil Science (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
Social Sciences and Humanities
Social science (6 cr)
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.

Required Professional Core Courses

Introductory

- FR 1001—Orientation and Information Systems (1 cr)

Resource Assessment

- NRES 4211—Survey, Measurements and Modeling in Natural Resources (3 cr)
FR 4131—GIS for Natural Resources Analysis (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

- 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 4411—Silviculture Systems (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 4501—Urban Forest Management (3 cr)
Ent 3001—Insects and Insect Management (1 cr)
and Ent 4251—Forest and Shade Tree Entomology (2 cr)
PIPa 3003—Diseases of Forest and Shade Trees (3 cr)

Economics, Management, and Policy

- FR 4232—Management of Recreational Lands (4 cr)
NRES 3241—Natural Resource Policy and Administration (3 cr)
NRES 3261—Economics and Natural Resources Management (3 cr)
Urbs 3001—Introduction to Urban Studies: The Complexity of Metropolitan Life (3 cr)

Additional Required Professional Courses

Select from the following groups with adviser approval; 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 5603—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

- ApEc 5321—Regional Economic Analysis (3 cr)
Anth 3041—Ecological Anthropology (3 cr)
Geog 3371—Introduction to Urban Geography (3 cr)
FR 4262—Remote Sensing of Natural Resources (3 cr)
FR 4131—Geographic Information Systems in Natural Resource Analysis (3 cr)
LA 1401—The Designed Environment (3 cr)

Mgmt 3001—Fundamentals of Management (2 cr)
 NRES 1201—Conservation of Natural Resources (3 cr)
 NRES 3000/5001—Colloquium in Natural Resources and Environmental Studies (1-2 cr)
 NRES 3202—Planning and Leadership in Natural Resource Management (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 this 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 4232—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 Rhet 1102—Writing on Issues of Science and Technology (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 (3 cr)
or EngC 3027—Advanced Expository Writing (4 cr)

Mathematical Thinking

Math 1142—Short Calculus (3 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 3301—Wood Industry Tours (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 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 4401—Forest Products Marketing (4 cr)

Marketing/Business

Acct 2050—Introduction to Financial Reporting (4 cr)
 Acct 3001—Introduction to Management Accounting (4 cr)
 Fina 3001—Finance Fundamentals (2 cr)
 BLaw 3058—The Law of Contracts and Agency (4 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)

The College of
Natural Resources
has an 11 to 1
student-faculty ratio,
ensuring personal
attention from
world-class
instructors.

Additional Required Courses

NRES 1041—Natural Resources as Raw Materials (3 cr)
CSci 1101—Introduction to Computers and Problem Solving (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 experience in the form of summer jobs, internships, and formal work cooperatives are viewed as 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, consists of a systematic examination of industry facilities in the region. Conducted during spring break, the course takes the 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 131 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 (3 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 3241—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

ChEn 4001—Material and Energy Balances (4 cr)
ME 3321—Thermodynamics (4 cr)
ME 3322—Heat Transfer and Fluid Flow (4 cr)
CE 4502—Water and Wastewater Treatment (3 cr)

Wood and Paper Science

WPS 1001—Wood and Paper Science Profession Orientation (1 cr)
WPS 1301—Wood as a Raw Material (3 cr)
WPS 3396—Industrial Internship (1 cr)
WPS 4301—Statics and Engineering Mechanics (3 cr)
WPS 4302—Wood Chemistry (3 cr)
WPS 4305—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 4362—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 experience in the form of summer jobs, internships, and formal work cooperatives are viewed as 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 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, consists of a systematic examination of industry facilities in the region. Conducted during spring break, the course takes the students off-campus to visit production facilities and meet with leaders in today's wood and paper science profession.

Minor Requirements

Students must complete 14 credits from the following:

WPS 4302—Wood Chemistry (3 cr)
WPS 4305—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 4362—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 Rhet 1102—Writing on Issues of Science and Technology (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 (3 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 3301—Wood Industry Tours (1 cr)

- WPS 3305—Fundamentals of Lumber Grading (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 4401—Forest Products Marketing (4 cr)

Industrial Engineering/Operations Management

- OMS 3001—Introduction to Operations Management (2 cr)
OMS 3056—Production and Inventory Management (4 cr)
IR 3021—Human Resource Management and Industrial Relations (2 cr)
IEOR 4521—Statistics, Quality, and Reliability (4 cr)
IEOR 5531—Engineering Optimization I (4 cr)
IEOR 5551—Production Planning and Control (4 cr)
IEOR 5552—Design and Analysis of Manufacturing Systems (4 cr)

Additional Required Courses

- NRES 1041—Natural Resources as Raw Materials (3 cr)
CSci 1101—Introduction to Computers and Problem Solving (3 cr)

Suggested Electives

- IEOR 5541—Project Management (4 cr)
IEOR 5553—Simulation of Manufacturing Systems (4 cr)
IR 3071—Collective Bargaining and Labor Relations (4 cr)
Acct 2050—Introduction to Financial Reporting (4 cr)
Mgmt 3001—Fundamentals of Management (2 cr)

Special Learning Opportunities

Work experience in the form of summer jobs, internships, and formal work cooperatives are viewed as integral components of the student's total education in the production management specialization. Opportunities for outside employment are posted and students and strongly encouraged to consider participation. 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, consists of a systematic examination of industry facilities in the region. Conducted during spring break, the course takes the



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 the complex building science 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 Rhet 1102—Writing on Issues of Science and Technology (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 (3 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 3301—Wood Industry Tours (1 cr)
- WPS 3312—Fundamentals of Lumber Grading (1 cr)
- WPS 3313—Building Estimating (1 cr)
- WPS 3332—Introduction to Residential Construction (2 cr)
- WPS 4309—Wood-Fluid Relationships (2 cr)
- WPS 4301—Statics and Engineering Mechanics (3 cr)
- WPS 4307—Wood-Base Panel Technology (3 cr)
- WPS 4355—Mechanics and Structural Design with Wood Products (3 cr)
- WPS 4333—Systems Approach to Residential Construction (2 cr)
- WPS 4334—Advanced Residential Building Science (3 cr)
- WPS 4335—Building Testing and Diagnostics (2 cr)
- WPS 4303—Wood Deterioration and Preservation (3 cr)

Supporting Courses

- Arch 5501—Environment and Material Forces in Architecture (3 cr)
- CE 3402—Introduction to Construction Materials (3 cr)
- CE 4101—Project Management (3 cr)
- DHA 2402—Residential Technology (3 cr)
- DHA 2463—Housing and Community (3 cr)
- IEOR 5531—Engineering Optimization I (4 cr)
- IR 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

- NRES 1041 Natural Resources as Raw Materials (3 cr)
- CSci 1101—Introduction to Computers and Problem Solving (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 4401—Forest Products Marketing (4 cr)

Special Learning Opportunities

Work experience in the form of summer jobs, internships, and formal work cooperatives are viewed as 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, consists of a systematic examination of industry facilities in the region. Conducted during spring break, the course takes the students off-campus to visit production facilities and meet with leaders in today's wood and paper science profession.

All paper science and engineering graduates in the class of '96 had employment offers prior to graduation that provided an average starting salary of \$43,000.

School of Nursing

This is the School of Nursing section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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School of Nursing

Established in 1909, the University of Minnesota School of Nursing holds the distinction of being the first 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
Biochemistry or Organic Chemistry	3
Cultural Anthropology or Sociology	3
Freshman Writing Course	3
General Psychology	3
Growth and Development	3
Microbiology	2
Nutrition	3
Pathophysiology	3
Pharmacology	3
Public Health (required if applying for fall 2000)	2
Upper Division Statistics	3
Literature, Philosophy, Arts/Humanities, Abnormal Psychology*, Small Group Dynamics*, Family Theory*	Any three of the six areas, at least 9 credits

*Must be completed before January 1, 1999.

The application deadline for fall 2000 is February 15, 2000. Selection is competitive because enrollment is limited to 98 students.

An admission GPA of 2.80 is preferred. The GPA is based upon prerequisites, and nine of the prerequisite courses must be completed to apply.

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 31.

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.

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.

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, students should 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 wide 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 located 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,

Ninety-four percent
of the 1996
undergraduate
School of Nursing
class found
employment as a
nurse within six
weeks of graduation.

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., Mpls.
624-5959

Development Office

5-139 Weaver-Densford Hall,
308 Harvard St., Mpls.
624-2490

Outreach Office

5-140h Weaver-Densford Hall,
308 Harvard St., Mpls.
624-4330

Office of Student Services

5-160 Weaver-Densford Hall,
308 Harvard St., Mpls.
624-4454

Alumni Relations

624-9494

Enrollment Management

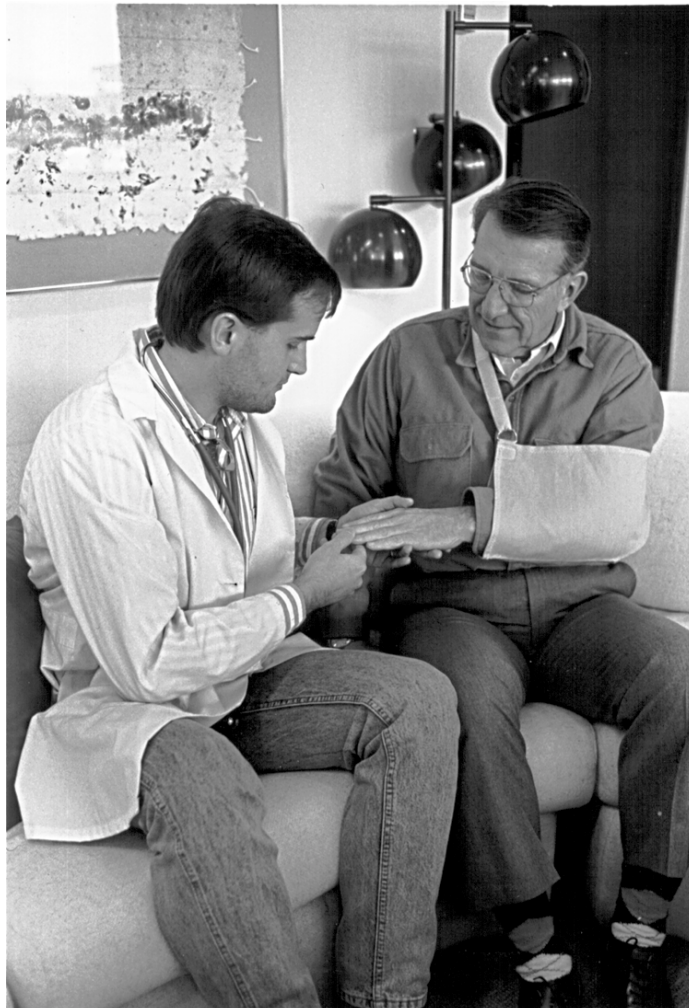
624-3108

Recruitment

624-9494

Registration

624-1906



Nursing

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. All students must complete a critical care practicum. These clinical experiences are planned and supervised by faculty members.

Admission Requirements—Students seeking admission for fall 2000 must complete nine of the prerequisite courses by February 15, 2000, and all prerequisites by August 31, 2000.

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.

Students applying for fall 1999 or fall 2000 must fulfill the literature, philosophy, arts/humanities prerequisite requirements with three courses. Students must choose each of the three courses from a different category among the following six categories: abnormal psychology, small group dynamics, family theory, literature, philosophy, and arts/humanities. Courses in abnormal psychology, small group dynamics, or family theory must be completed by January 1, 1999. The three highest course grades will be used to calculate the School of Nursing admission GPA.

All prerequisite coursework must be completed and documentation of passing submitted by August 31 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

Phcl 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 4202—Core Interventions for Nursing Practice

Nurs 4205—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 4406—Leadership and Management for Shaping Professional Nursing Practice

Nurs 4410—Critical Care Nursing

Nurs 4501—Critical Care Nursing Practice

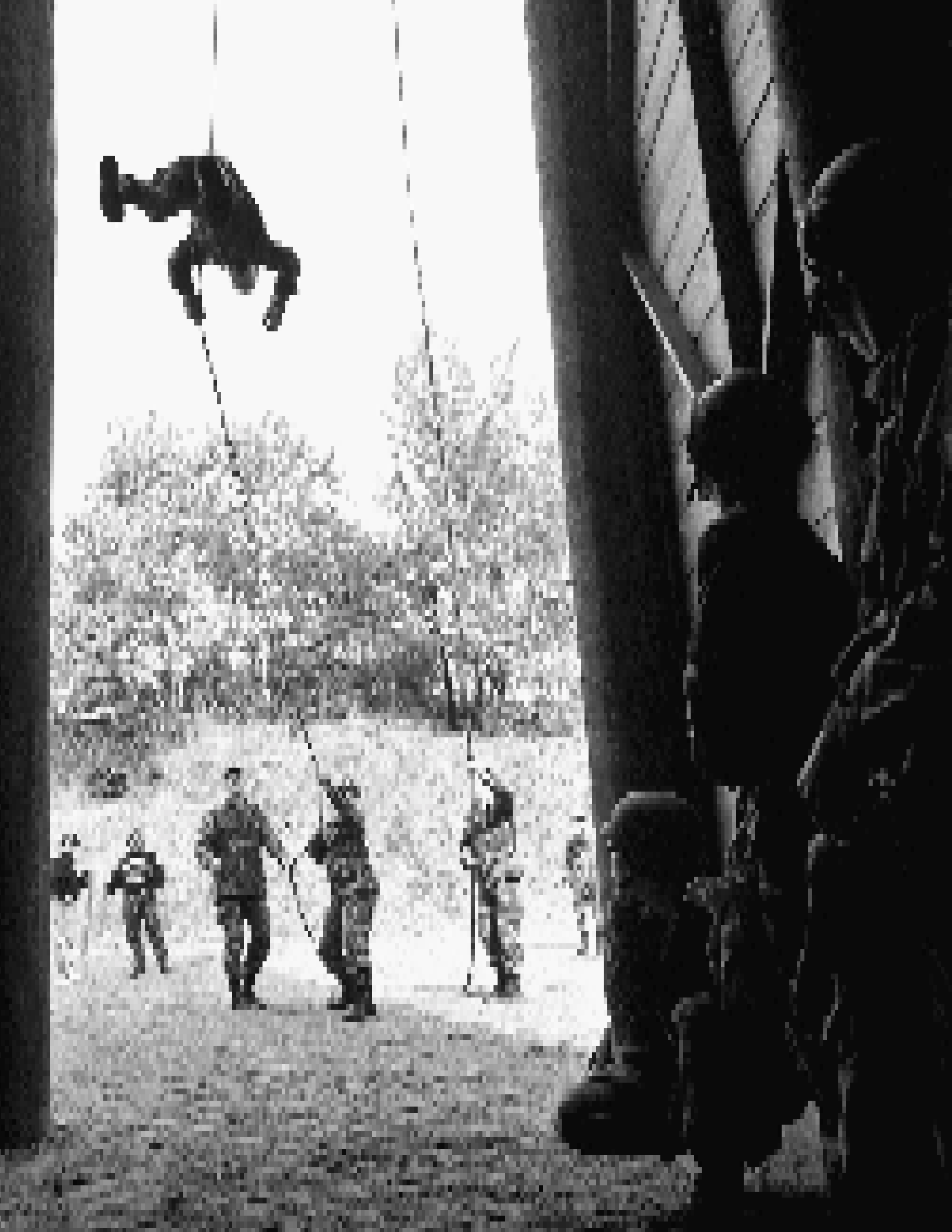
According to the
Gourman Report, the
School of Nursing
undergraduate
program is ranked
12th in the nation.

Reserve Officers Training Corps

This is the ROTC section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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Reserve Officers Training Corps

ROTC

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. 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 & Athletics 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 \$150 per month. Nonscholarship students in their junior and senior years receive the \$150 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 228).

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 eight and six 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

ROTC

General Information

Military Science

Naval Science

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.

ROTC scholarship programs provide up to four years of subsidized education, paying all tuition costs, instructional fees, and textbook expenses.

Students attending other colleges in the area may also enroll in Army ROTC at the University of Minnesota through University College 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 on the following page. 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.

For more than 150 years, on-campus military training and ROTC programs have provided intelligent, well-educated leaders for the nation's defense.

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-, two-, and one-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. The one-year program is specifically for nursing, law, and electrical engineering students. 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 six-week course for the two-year program).

Applicants selected for flight training must be able to complete graduation requirements and be commissioned before reaching 26¹/₂ 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 \$150 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 \$150 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 one three-year scholarship available to the most deserving freshman in the program. AFROTC also offers a noncompetitive, two-year scholarship (open to all degrees) that pays \$2,000 per year for tuition, books, and fees plus the \$150 monthly, nontaxable allowance. For the most current information about scholarship options and requirements, call (612) 624-2884.

Directory

Military Science (Army ROTC)

Lieutenant Colonel Robert E. Biller, USA
110 Armory Building
15 Church St. S.E.
Minneapolis, MN 55455-0137
(612) 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 St. S.E.
Minneapolis, MN 55455-0137
(612) 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 St. S.E.
Minneapolis, MN 55455-0137
(612) 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

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, 2,000 in graduate programs, and 400 faculty, IT's 11 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.

$$\text{AAR} = \text{High school rank percentile} + (2 \times \text{ACT composite score})$$

$$\text{SAR} = \text{High school rank percentile} + (\text{SAT verbal} \div 10 + \text{SAT math} \div 10)$$

An AAR of 130 or better, or SAR of 195 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.

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 Undecided" 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 237 for requirements common to all IT basic lower division curricula.)

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.

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. 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.

Sixteen degrees are offered:

- bachelor of aerospace engineering and mechanics¹
- bachelor of science in astrophysics
- bachelor of biosystems and agricultural engineering¹
- bachelor of chemical engineering¹
- bachelor of science in chemistry
- bachelor of civil engineering¹
- bachelor of computer engineering
- bachelor of science in computer science
- bachelor of electrical engineering¹
- bachelor of geological engineering¹
- bachelor of science in geology
- bachelor of science in geophysics
- bachelor of materials science and engineering¹
- bachelor of science in mathematics
- bachelor of mechanical engineering¹
- bachelor of science in physics
- bachelor of science in statistics

¹ 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 conferred by a single department, students can combine coursework from several departments.

Many interdisciplinary programs are possible. A few examples include acoustics, bioengineering, environmental engineering, nuclear engineering, and transportation. Students should contact their department office or visit 105 Lind Hall for more information.

Premedical Programs—Because there is no prescribed premedical major, some students plan their IT programs as preparation for medical school. The Minnesota medical schools, in Duluth, Minneapolis, and Rochester, give strong preference to applicants who are state residents.

The Minneapolis campus Medical School has approved the following courses to fulfill its premedical requirements.

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, 1301, 1302 (12-15 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.

Management Minor

This program is for IT undergraduates who wish to broaden their education by taking management courses. The program trains future engineers and scientists in accounting, operations and management sciences, finance, and marketing. Courses are taught by Carlson School of Management faculty. For applications, contact the Center for the Development of Technological Leadership, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55455 (612/624-5747).

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, 1271-1272¹
Math 1571-1572
Phys 1301, 1302
Phys 2303², 2601

¹To 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.

²To 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.

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.

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 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 two undergraduate programs, the management minor (see page 237) and IDEAS (see below), and 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.

IT's innovative
"cohort" program
places new students
into teams that take
classes together—
helping freshmen
meet other students,
form study groups,
and establish
friendships.

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, 102 Nicholson 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 Technolog* (technical magazine). The IT Board of Publications selects editors and business managers and directs the overall policy of the publications. Students are encouraged to participate as publication staff members.

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.

Directory

(area code 612)

Office of the Dean

105 Walter Library
624-2006

Office of the Associate Dean for Student Affairs

106 Lind Hall
624-5091

Office of Lower Division Programs

128 Lind Hall
624-2890

Student Affairs Office

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

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

4 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

Degree Programs

Aerospace Engineering

Department of Aerospace Engineering and Mechanics

B.A.E.M.

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.

The overarching goal of the undergraduate program is to produce graduates who are prepared to enter and sustain the practice of aerospace engineering or related fields, or to pursue advanced studies. 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

To complete the degree, students must complete at least 126 credits, 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 addition 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 1107—Introduction to FORTRAN Programming for Scientists and Engineers
EE 3005, 3006—Fundamentals of Electrical Engineering and Lab
Math 1271, 1272—Calculus I, II
Math 2243—Linear Algebra and Differential Equations
Math 2263—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++. Students with previous programming experience are encouraged to substitute CSci 1113 for the required course CSci 1107.
 - 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 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 (15 cr)

Math 1272—Calculus II (4 cr)
 Phys 1302—Introductory Physics II (4 cr)
 Biol 1001—Introductory Biology I (4 cr)
 CSci 1107—Introduction to FORTRAN (3 cr)

Sophomore Year

Fall Semester (17 cr)

Math 2263—Multivariable Calculus (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 2243—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

To complete the degree, students must complete at least 120 credits, 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 (recommended)

Ast 2001—Astrophysics

Two 4xxx or 5xxx astronomy courses

Ast 4994—Senior Thesis (3 cr min)

Math 1271, 1272 (or 1371, 1372 or 1571, 1572)

Math 2243, 2263, 2283

Phys 1301, 1302 (or 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 1271—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 1272—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 2243—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 2263—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)

Biosystems and Agricultural Engineering

B.B.A.E.

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 2.20).

Degree Requirements

To complete the degree, students must complete at least 128 credits, 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)
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—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)
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 (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 1271—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 1272—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 2263—Multivariable Calculus (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 2243—Linear Algebra and Differential Equations (4 cr)
CSci 1107—Computer Programming in FORTRAN (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

The chemical
engineering program
was ranked #1 in the
nation in the
National Research
Council's 1995 report.

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

To complete the degree, students must complete at least 130 credits, 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—Calculus I
Math 1272—Calculus II
Math 2243—Linear Algebra and Differential Equations
Math 2263—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—Fortran Programming
MatS 3011—Introduction to the Science of Materials
Phys 1301—Introductory Physics I
Phys 1302—Introductory Physics II

Elective emphasis courses chosen from 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

Electives—Emphasis courses may be chosen by the student, in consultation with a faculty adviser, from any area of study available at the University.

Elective Internships and Co-op

The Department of Chemical Engineering and Materials Science will initiate an internship or cooperative education program beginning fall semester 1999. The program will provide students with industrial experience during their junior and senior years and enable them to gain academic credit for their experience upon completion of the program.

Through the intern program, students will gain an understanding of an engineer's role in industry. They will also be able to apply some of their knowledge of fundamental theory to the solving practical problems, which may subsequently influence their selection of elective courses.

Requirements (such as minimum GPA, completion of all lower division requirements, and admission to the upper division major program) must be met before students begin their first industrial assignment. Such issues will be decided before the program begins operation.

Sample Program

Freshman Year

Fall Semester (16 cr)

Chem 1021—General Principles of Chemistry I with Lab (4 cr)
Math 1271—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 1272—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 2263—Multivariable Calculus (4 cr)
CSci 1107—Introduction to FORTRAN (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 2243—Linear Algebra and Differential Equations (4 cr)
Liberal education elective #4 (Humanities I) (3 cr)

Junior Year (17 cr)

Fall Semester

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)

Spring Semester (15 cr)

ChEn 4502—Chemical Engineering Process Design II (3 cr)
ChEn 4601—Process Control (3 cr)
ChEn 4402—Chemical Engineering Lab II (3 cr)
Technical elective (Emphasis III) (3 cr)
Technical elective (Emphasis IV) (3 cr)



Chemistry

Department of Chemistry

B.S.Chem.

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

To complete the degree, students must complete at least 120 credits, including 40 credits in the major. The chemistry curriculum includes courses in chemistry, physics, mathematics, and the liberal arts. Specific degree are:

Chemistry Lect/Lab (31 cr)
Mathematics (12 cr)
Calculus-based Physics (8 cr)
Advanced Chemistry Lect 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, a student 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. A student 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. Each student plans his or her degree program by submitting one-year plans in consultation with an adviser. The final one-year degree plan must be certified for graduation by the department.

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 4111, 4311, 4511, 4711, Chem 4094—Directed Studies)

Advanced technical electives—Two 3xxx or higher courses of 3 credits or more in any field of science (6 cr)

Math 1271—Calculus I (4 cr)

Math 1272—Calculus II (4 cr)

Math 2243—Linear Algebra and Differential Equations

or Phys 2303—Physics III (4 cr)

Math 2263—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 1271—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 1272—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 2263—Multivariable Calculus (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 2243—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 2.30).

Degree Requirements

To complete the degree, students must complete at least 128 credits, 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)¹

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)²

A total of 62 credits are required from other departments, distributed as follows:

Math 1271, 1272, 2243, 2263 (16 cr)

Phys 1301, 1302 (8 cr)

Chem 1021, 1022 (8 cr)

Geo 1001 (3 cr)

AEM 2011—Statics (3 cr)

AEM 2012—Dynamics (3 cr)¹

AEM 3031—Deformable Body Mech (3 cr)

Stat 3021—Applied Statistics (3 cr)

Liberal education electives (15 cr)

¹**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

²**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

Civil Engineering

Computer Engineering

Computer Science

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.

Final Project

All civil engineering students must complete CE 4102—Capstone Design.

Sample Program

Freshman Year

Fall Semester (16 cr)

Math 1271—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 1272—Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Geo 1001—The Dynamic Earth: An Introduction to Geology (3 cr)
Liberal education elective (4-6 cr)

Sophomore Year

Fall Semester (16 cr)

Math 2263—Multivariable Calculus (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 2243—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 (15-16 cr)

CE 4301—Soil Mechanics II (3 cr)
CE elective (3 cr)
CE elective (3 cr)
CE elective (3 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 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 year-long 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

To complete the degree, students must complete at least 126 credits, including 78 credits in the major. The curriculum includes 16 credits of calculus from mathematics; 8 credits of calculus-based physics; 4 credits of an engineering science elective outside of electrical engineering; 34 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 Computer Architecture and Assembly Language
 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—Electromagnetic Fields and Waves
 EE 4951—Senior Design 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—Calculus I
 Math 1272—Calculus II
 Math 2243—Linear Algebra and Differential Equations
 Math 2263—Multivariable Calculus
 Phys 1301—Introductory Physics I
 Phys 1302—Introductory Physics II
 Engineering science elective (3 cr)

Final Project

All students must take EE 5951—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

Freshman Year

Fall Semester (15 cr)

EngC 1011—University Writing and Critical Reading (4 cr)
 Math 1271—Calculus I (4 cr)
 Phys 1301—Introductory Physics I (4 cr)
 Liberal education elective (3 cr)

Spring Semester (16 cr)

Math 1272—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 2243—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 2263—Multivariable Calculus (4 cr)
 CSci 2011—Discrete Structures of Computer Science (4 cr)
 EE 2011—Linear Systems and Circuits (3 cr)

EE 2361—Introduction to Computer Arch and Assembly Language Programming (3 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—Electromagnetic Fields and Waves (4 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

To complete the degree, students must complete at least 124 credits, 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—Calculus I
 Math 1272 or 1372—Calculus II
 Math 2243—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 information.

Sample Program

Freshman Year

Fall Semester (15-16 cr)
 Math 1271—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 1272—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 2243—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 year-long 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

To complete the degree, students must complete at least 126 credits, 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, 37 credits of required electrical engineering courses, 26 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 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 grade in all electrical engineering courses must be C- or better.

Required Courses

EE 2301—Introduction to Digital System Design
EE 2361—Introduction to Computer Architecture and Assembly Language
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—Electromagnetic Fields and Waves
EE 4951—Senior Design Project
Math 1271—Calculus I
Math 1272—Calculus II
Math 2243—Linear Algebra and Differential Equations
Math 2263—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—8 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 1271—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 1272—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 2243—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 2263—Multivariable Calculus (4 cr)
EE 2361—Introduction to Computer Arch and Assembly Language Program (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—Electromagnetic Fields and Waves (4 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 1271—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 1272—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 2243—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 2263—Multivariable Calculus (4 cr)
EE 2361—Introduction to Computer Arch and Assembly Language Program (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—Electromagnetic Fields and Waves (4 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

To complete the degree, students must complete at least 128 credits, 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 4211—Solid Earth Geophysics I
 Geo 3911—Introduction to Field Geology
 Geo 4501—Structural Geology
 Geo 4602 or 4701 or 4703
 Math 1271—Calculus I
 Math 1272—Calculus II
 Math 2243—Linear Algebra and Differential Equations
 Math 2263—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 1271—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 1272—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 2263—Multivariable Calculus (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 2243—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 1271—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 1272—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 2263—Multivariable Calculus (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 2243—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.

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

To complete the degree, students must complete at least 120 credits, 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.

Geology

Geophysics

Materials Science and Engineering

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—Calculus I and II (or 1371, 1372 or 1571, 1572)
Math 2243—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 1271—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 1272—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 2243—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.

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

To complete the degree, students must complete at least 120 credits, 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—Calculus I and II (or 1371, 1372 or 1571, 1572)
Math 2243—Linear Algebra and Differential Equations
Math 2263—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 1271—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 1272—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 2243—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 2263—Multivariable Calculus (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)

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

To complete the degree, students must complete at least 128 credits, including 33 credits in the major. Credits include the specific required courses listed below and at least 60 credits of upper division courses. In addition, the University's liberal education requirements must be met.

Required Courses

MatS 3011—Introduction to the Science of Materials (3 cr)
MatS 3012—Introduction to Mechanical Behavior of Materials (4 cr) (includes lab)
MatS 4001—Introduction to the Thermodynamics of Materials (3 cr)
MatS 4002—Mass Transport and Kinetics (3 cr)
MatS 4013—Introduction to Electric and Magnetic Properties of Materials (3 cr)
MatS 4212—Introduction to Ceramic Materials (3 cr)
MatS 4214—Polymer Physical Properties (3 cr)
MatS 4221—Materials Design and Performance (4 cr) (includes lab)
MatS 4301—Materials Processing (4 cr) (includes lab)

Materials Science and Engineering

Mathematics

Mechanical Engineering

MatS 4400—Senior Design Project (3 cr)
AEM 2011—Statics (4 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—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)
Phys 1301—Introductory Physics I (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Phys 2303—Introductory Physics III (4 cr)

Electives—Most 2xxx, 3xxx, 4xxx, or 5xxx courses in mathematics, chemistry, or engineering programs in IT. Other courses may qualify; see the director of undergraduate studies.

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 1271—Calculus I (4 cr)
EngC 1011—University Writing and Critical Reading (4 cr)

Spring Semester (16 cr)

Chem 1022—General Principles II with Lab (4 cr)
Phys 1302—Introductory Physics II (4 cr)
Math 1272—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 2263—Multivariable Calculus (4 cr)
AEM 2011—Statics (4 cr)
Liberal education elective #2 (social sciences I) (3 cr)
Liberal education elective #3 (social sciences II) (3 cr)

Spring Semester (17 cr)

Math 2243—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 (no lab) (3 cr)
MatS 4001—Thermodynamics (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 3012—Physical Materials and Mechanical Behavior of Materials (4 cr)
MatS 4013—Electronic 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 4301—Materials Processing and Lab (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 can be adapted to satisfy a wide variety of interests and needs. Students can prepare for graduate study in mathematics or for secondary school teaching, or can emphasize various fields of interest, such as applied mathematics, computer science, or actuarial science.

Admission Requirements—Complete specific lower division courses and meet GPA requirement set by IT (currently 2.00).

Degree Requirements

To complete the degree, students must complete at least 120 credits, including 48 credits in the major, not counting the elective. Students take a lower division mathematics sequence of five semesters (four semesters if honors sequence is chosen) and then take eight approved upper division mathematics courses, including two courses in algebra and two in analysis. Also required are three semesters of physics, one semester of computer science, and two semesters of technical electives (which can be more mathematics).

Students must take all required mathematics, physics, computer science, and composition courses A-F and must earn a grade of C- or better in all of those courses.

Required Courses

Lower Division Requirement

One of the following sequences:

Math 1271-1272-2243-2263-2283
Math 1371-1372-2373-2374-2283
Math 1571-1572-2573-3574

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

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.

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
CSci 1113—Introduction to C/C++ Programming for Scientists and Engineers

Liberal education electives (15 cr)

Electives—Technical elective (two courses, not necessarily in mathematics, of at least 3 credits each that satisfy three requirements):

- (1) Calculus (1271 or equivalent) is a prereq (or a prereq for a prereq);
- (2) The courses are 3xxx or higher;
- (3) The courses form a coherent part of the student's program, as determined in consultation with the student's adviser.

Minor Requirements

A minor is available through the College of Liberal Arts. Complete all lower division requirements for the major plus two approved upper division math courses.

Sample Program

Freshman Year

Fall Semester (15 cr)

Math 1271—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 1272—Calculus II (4 cr)
Phys 1302—Introductory Physics II (4 cr)
CSci 1107—Introduction to FORTRAN
or CSci 1113—Introduction to C/C++ (4 cr)
Liberal education elective (3 cr)

Sophomore Year

Fall Semester (15 cr)

Math 2243—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 2263—Multivariable Calculus (4 cr)
Math 2283—Sequences, Series and Foundations (3 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 U of M is a founding member of the Center for Research Libraries, a cooperative resource with more than five million volumes of primary research materials.

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).

Degree Requirements

To complete the degree, students must complete at least 127 credits, 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)

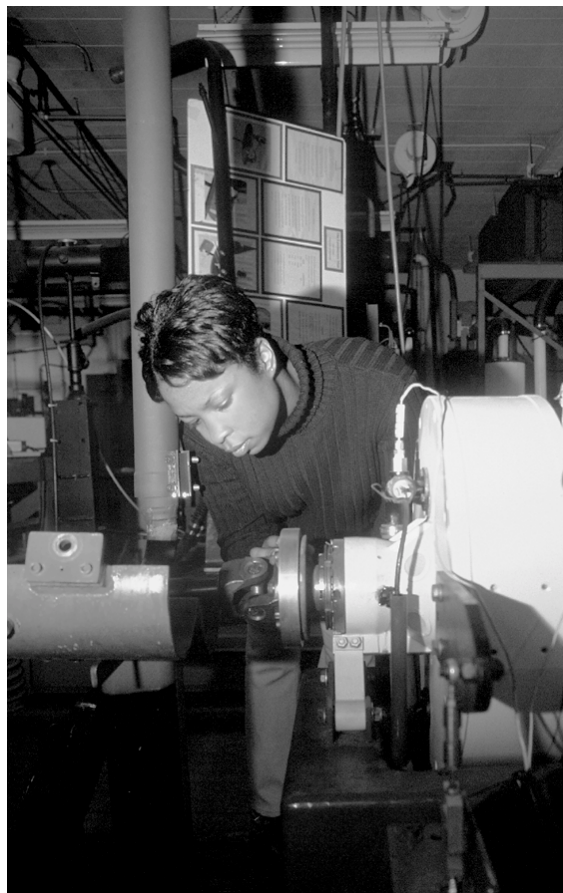
ME 3322—Heat Transfer and Fluid Flow (4 cr)

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—Calculus I, II (4 cr each)

Math 2243—Linear Algebra and Differential Equations (4 cr)

Math 2263—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 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 1271—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 1272—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 2263—Multivariable Calculus (4 cr)

AEM 2021—Statics and Dynamics (4 cr)

CSci 1113—Introduction to C/C++ Programming (4 cr)

MatS 2001—Introduction to Mechanical Properties* (4 cr)

Spring Semester (17 cr)

Math 2243—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.

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. By choosing appropriate technical electives, a student can prepare for graduate or professional school in physics, medicine, biophysics, engineering, chemistry, environmental physics, geophysics, or atmospheric 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

To complete the degree, students must complete at least 120-128 credits, 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 1571, 1572, 2573 (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

Freshman Year

Fall Semester (15 cr)

Math 1271 or 1371 or 1571—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)

Physics

Statistics

Spring Semester (15 cr)

Math 1272 or 1372 or 1572—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 2573—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 3574 (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.

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

To complete the degree, students must complete at least 120 credits, 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 elective 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 5101-2—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—Calculus I-II

Math 2263—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.

University College

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University College

UC

University College (UC) offers accessible lifelong and distance education opportunities to individuals and organizations. Established in 1913, UC 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.

UC offers degrees, certificates, and courses, as well as degrees from other colleges within the University that may be completed through evening and distance learning classes. With programs and services that cross the usual boundaries of time, place, mode of delivery, and academic discipline, UC provides the knowledge and skills required in an information-based world and workplace.

Admission

Admission to UC Degree and Certificate Programs—

All UC 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. For general questions about admission to UC degree or certificate programs, contact UC Student Support Services at (612) 625-3333.

Note: Simply registering for UC classes and earning credit does not mean that you have been admitted to a degree program. Students must apply formally to the college or program granting the degree. An adviser can explain when and how to apply for admission to a college and help in course selection.

Liberal Education Requirements—Most University of Minnesota-Twin Cities campus degree programs require a common, standardized set of liberal education requirements. If you are undecided about a major, you can begin working on these requirements in UC evening and distance education courses and be assured that they will apply toward your degree. If you are already pursuing a degree, check with your college adviser for help in selecting liberal education requirements. If you wish to enroll in UC courses and are not yet admitted to a degree program, contact an adviser in UC Student Support Services at (612) 625-3333 for a list of UC courses that fulfill liberal education requirements.

Note: If you are pursuing a certificate or UC partnership degree, contact a Student Support Services adviser for requirements unique to those programs.

Degrees

Students have two broad options for earning baccalaureate degrees through UC—individualized degrees or partnership degrees. About 20 certificate programs also are offered through UC. For more information about these options, check the current *University College Catalog*. To receive a copy, call (612) 625-3333.

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.

UC 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.

UC'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 providing students with 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 an individualized study incorporating a variety of learning resources and strategies, such as independent learning projects. PIL students work collaboratively with academic advisers and faculty from 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 will attempt 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.

Applied Partnership Degrees

Students may also consider one of four applied baccalaureate degrees, offered in partnership with area community colleges and designed for working adults: Bachelor of Applied Business (B.A.B.), Bachelor of Information Networking (B.I.N.), Bachelor of Emergency Health Services (B.E.H.S.), and Bachelor of Construction Management (B.C.M.).

Degrees in bachelor of network administration and bachelor of human services are currently being developed. For more information, call UC Student Support Services at (612) 625-3333.

Bachelor of Applied Business (B.A.B.) is an upper division, practitioner-oriented business degree. Designed for adults who want education to enrich their lives and careers, the degree allows students to develop skills and

University College is the University of Minnesota's major point of access and educational opportunity for the nontraditional, part-time, summer, and distance learner.

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. B.A.B. 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-B.A.B. courses in the evening at these convenient sites and at the University of Minnesota. Many pre-B.A.B. 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.

The upper division courses (listed with the "ABus" designator) in the B.A.B. 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. By spring 2000, most courses in the program will be available through Distance Education on the World Wide Web and through self-paced study.

For more information, call UC Student Support Services at (612) 625-3333 or e-mail UBAB@mail.cee.umn.edu.

Bachelor of Construction Management (B.C.M.) 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. B.C.M. 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 degree offers experience and education for a professional management career in the construction industry. For more information, contact UC Student Support Services at (612) 625-3333 or e-mail ceeadv@mail.cee.umn.edu.

Bachelor of Emergency Health Services (B.E.H.S.) is offered cooperatively with Inver Hills Community College in Inver Grove Heights and Regions Hospital in St. Paul. The degree 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 UC Student Support Services at (612) 625-3333 or e-mail ceeadv@mail.cee.umn.edu.

Bachelor of Information Networking (B.I.N.) 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 degree 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 UC Student Support Services at (612) 625-3333 to speak with a B.I.N. adviser or e-mail at UBIN@mail.cee.umn.edu.

Other Degree Programs

Several other University of Minnesota degrees, in more than 25 major areas, may be earned entirely or almost entirely through UC registration in evening and Distance Education courses. See separate department sections for more information and specific program requirements

Certificates

In addition to baccalaureate degrees, certificate programs offered through UC 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 you for further college work.

Coursework may be completed in UC evening classes, Distance Education, Continuing Education for Women courses, day school, summer session, or any combination of these. Students can obtain a copy of "UC Certificate Program Information" with an application form by contacting UC Student Support Services at (612) 625-3333.

University College Certificates

- Alcohol and Drug Counseling Education
- Cardiovascular Perfusion Technology
- Child Abuse Prevention Studies
- Information Networking
- Geriatric Pharmacotherapy
- Liberal Arts
- Ophthalmology Technician
- Organizational and Professional Communication
- Orthoptics Study
- Scientific and Quantitative Methods
- Solid Waste Management

Undergraduate Development Certificates

- Accounting
- Business Administration
- Civil Engineering
- Computer Science
- Electrical and Computer Engineering
- Engineering and Science
- Industrial Engineering
- Mechanical Engineering

Honors

All UC 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 the appropriate section of this catalog and contact the specific program for more information on honors options.

Graduation Requirements

Procedures for graduation with a baccalaureate degree vary by collegiate unit and program. Some units have earlier deadlines than others for filing the graduation application. Check with the specific college or degree program for detailed information about graduation.

Advising

UC Student Support Services—The UC Student Support Services office offers academic advising and financial aid advising free of charge to all students interested in UC courses, 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 UC classes should consult an adviser early in their planning. For more information, contact UC Student Support Services at (612) 625-3333 or e-mail ceeadv@mail.cee.umn.edu.

Special Learning Opportunities and Resources

Distance Education (DE) 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 of the 340 DE courses are available by correspondence through the U.S. mail. A growing number of courses (more than 100 so far) 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 on-line. Many other courses include audio tapes, videotapes, and computer disks. There is no admission requirement to register for DE courses. Most courses are self-paced and allow up to nine months to complete the coursework. Most courses allow year-round registration.

Students may register on line, by fax, mail, or in person. Credits earned through DE 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 UC certificate or degree programs. DE courses can also satisfy residency requirements, with approval from colleges.

For information on courses, policies, and registration, ask for a *Distance Education Catalog* by calling (612) 625-3333 or 1-800-234-6564. Information is also available at e-mail indstudy@tc.umn.edu or visit the on-line catalog, which contains an up-to-date and complete listing of courses available and courses in development at www.cee.umn.edu/dis/.

Independent Study (UC 3075)—UC 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

University College Student Support Services administers the Tuition Assistance Grant Program and several scholarship programs for UC students, helps UC students to explore financial aid options and obtain aid, and collaborates with the University's Office of Scholarships and Financial Aid to provide aid for students enrolled in Distance Education correspondence courses.

UC 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 UC alumni and friends. For more information, contact UC Student Support Services at (612) 625-3333 or e-mail ceeadv@mail.cee.umn.edu.

Student Organizations

University College Student Board provides a forum for UC students, faculty, and administration to exchange ideas and information. The board is composed of UC students, the Dean of University College or designated representative, and two faculty or UC staff members. All students are encouraged to communicate ideas, suggestions, and concerns to the UC 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 University of Minnesota UC credits in the last five years and must be enrolled for a minimum of 3 UC 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 UC Student Board run for one year, beginning on May 15 and ending on the following May 15.

Directory

(area code 612)

UC Assistance and Registration Center

101 Wesbrook Hall
77 Pleasant Street S.E.
Minneapolis, MN 55455
625-3333
Fax: 625-1511
E-mail: ceeadv@mail.cee.umn.edu
<www.cee.umn.edu/couns>

Registration and Information

625-3333

Catalog Requests

625-3333

Academic and Financial Aid Advising

625-3333

Applied Degrees and Certificates

625-3333

Conference Registration Services

625-6616

Administrative Offices

Office Of The Dean

150 Wesbrook Hall
Minneapolis, MN 55455
626-9725
Gail Skinner-West, interim dean, 624-5542
Ann Pflaum, associate dean, 626-1788
David Grossman, associate dean, 626-2255
Gerald Klement, administrative director,
624-1561

Administrative Units

Client Relations

203 Nolte Center
Minneapolis, MN 55455
624-6053
Geri Malandra, director, 626-7535

Distance Education

338 Nolte Center
Minneapolis, MN 55455
626-7970
Judith Gaston, interim director, 625-9362

Media Resources

625-3001

Marketing and Promotion

2037 University Ave. S.E., Suite 200
Minneapolis, MN 55455
624-5004
Gayle Hendrickson, director, 624-1045

Catalog Requests

625-3333

Program Management and Development

314 Nolte Center
Minneapolis, MN 55455
624-8831
William VanEssendelft, director, 625-5058

College in the Schools

624-5092

Compleat Scholar/Practical Scholar

624-8880

Conference Services

625-0727

Continuing Education for Women

624-5267

Summer Session

624-3555

Student Support Services

200 Wesbrook Hall
Minneapolis, MN 55455
625-3333
Earl Nolting, director, 626-7576

Departments and Programs

Bachelor of Applied Business (B.A.B.)

214 Nolte Center
Minneapolis, MN 55455
626-1348

Victoria Mikelonis-Paraskov, faculty
director, 624-8206

Phil Stedje, adviser, 625-7356

E-mail: UBAB@mail.cee.umn.edu
<www.cee.umn.edu/bab>

Bachelor of Construction Management (B.C.M.)

214 Nolte Center
Minneapolis, MN 55455
625-5073

Jeff Walkup, program associate, 624-1641

Teresa Fruen, adviser, 625-5041

E-mail: tfruen@mail.cee.umn.edu
<www.cee.umn.edu/bcm/>

Bachelor of Emergency Health Services (B.E.H.S.)

300 Nolte Center
Minneapolis, MN 55455
626-1483

Carol Lund, program director,
625-4352

Judi Linder, program director, 625-3475

Sue Peterson, adviser, 625-8062

E-mail: speterso@mail.cee.umn.edu
<www.cee.umn.edu/pdm/BEHS.html>

Bachelor of Information Networking (B.I.N.)

314 Nolte Center
Minneapolis, MN 55455
625-5073

Brian Duren, program director, 626-7311

Teresa Fruen, adviser, 625-5041

E-mail: UBIN@mail.cee.umn.edu
<www.cee.umn.edu/BIN>

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

Archibald Leyasmeyer, faculty director,
624-8879

E-mail: pil@tc.umn.edu
<www.pil.umn.edu/>

Organizations

University College Student Board

314 Nolte Center,
Minneapolis, MN 55455
626-8501

University College

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 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 UC 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 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.

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.

B. Preparing a Statement of Academic and Career Goals

The first task in developing a degree plan is preparing a statement of personal educational goals and objectives. While the statement need not be lengthy, it must clearly describe what students want to learn and why. The document 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, 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 your 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 can be difficult to predict. It usually requires about as much time as a traditional program, but can offer greater flexibility and control of students' time.

The program began in 1971 as one of the original University Without Walls programs founded through cooperative efforts at institutions around the country. The program was based on the belief that people learn in many different ways, at different times and places in their lives, and that they should be actively involved in their own learning.

PIL is headquartered on the University's Minneapolis campus, but students may work with faculty on any of the University campuses.

Criterion-Based Education

This program challenges students to think about learning in new ways. A set of standards, called graduation criteria, describes the basic academic structure of the bachelor's degree. These criteria, rather than number of credits or courses, 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 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 one-third to one-half 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 of approaches to the human condition through works of art, literature, and philosophy; knowledge of how artists create and humanistic scholars think; and ability to make aesthetic judgments.

Criterion 3: Historical Perspective—Studies will involve historical perspective through understanding of 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 and 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 or the depth criteria. 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 UC credits are attached to all registrations in the program.

I. Admissions Stage

The admissions stage allows students and the program to learn about each another and to determine whether they 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 one of our information meetings (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. 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.

Although the formal application can be evaluated at any time during the year, specific deadlines for each semester are listed on the application.

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 throughout 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 select learning activities (courses and projects) relevant to the study area. Students will learn or review the foundations of a liberal arts education and 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; consult with advisers to ensure you are making appropriate alterations.

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, whether based on 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. Those activities might include developing project proposals, evaluating prior learning, implementing independent projects, pursuing research efforts, performing directed field learning, gaining sound evaluations, and improving writing skills.

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 Distance Education 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 if students can make arrangements with an appropriate faculty member. Students may take a regular course on an independent basis, study in a special area through individualized study, do guided research, or assist in teaching a course.

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 an additional step. After completing the learning activities described in the degree plan, students must complete an extensive record of their undergraduate education, known as the graduation dossier, and submit this document for review by 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, and learning activities acquired during the program. The dossier will include an introduction, an 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.

Applications from Students Living Outside the Twin Cities Area

PIL will consider applications from students living within commuting distance of the Twin Cities metropolitan area. Students must have completed at least 30 college credits to be considered for admission. The program will also attempt to serve former University of Minnesota students who live outside the region, but they must have completed about 60 credits.

Applied Business

B.A.B.

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 B.A.B. degree at the University. B.A.B. 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 University College classes, 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.B. 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

To complete the degree, students must complete at least 120 credits, including at least 57 credits in the major. B.A.B. 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.B. academic advisers.

Final Project

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

Construction Management

B.C.M.

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.

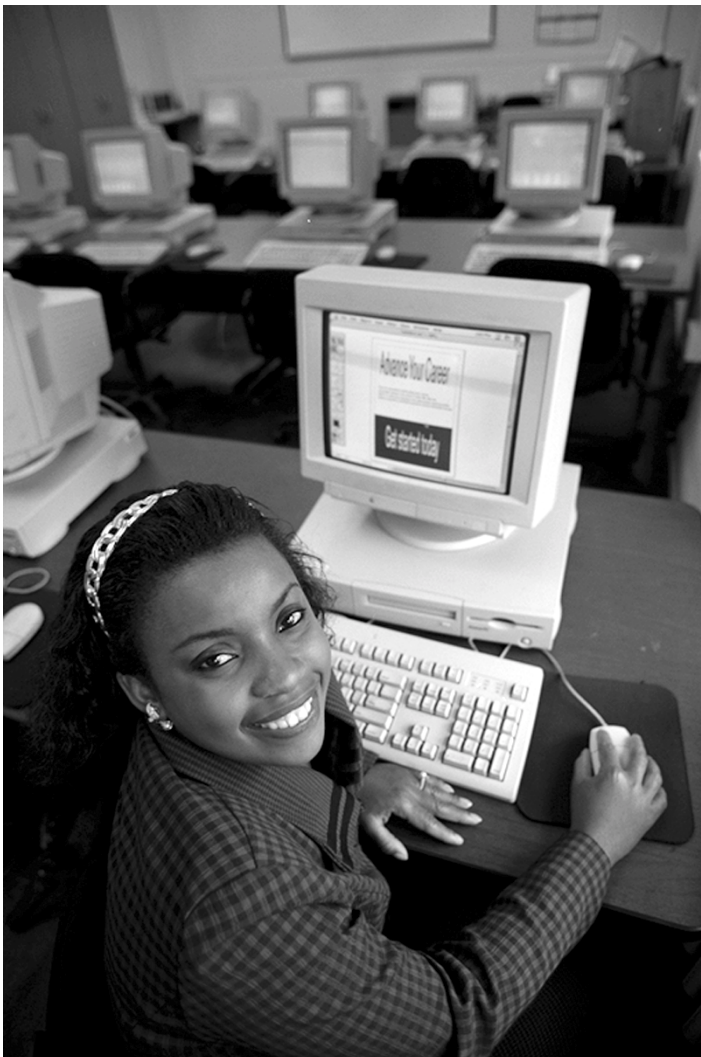
Courses in construction management have been created specifically for the B.C.M. In addition, the program draws on the expertise and coursework in architecture, civil engineering, and other University departments.

The B.C.M. 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 47 credits with a cumulative overall GPA of 2.50 or higher. 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 47-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.C.M. 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.C.M. adviser or through curriculum for the A.S. in Construction Management at a community college.

Degree Requirements

To complete the degree, students must complete at least 123 credits, including at least 58 credits in the major.

The interdisciplinary curriculum of the B.C.M. degree 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 Courses

Business and Management

CMgt 4011—Construction Documents and Contracts
CMgt 4012—Risk Management, Bonds, and Insurance
CMgt 4013—Legal and Ethical Issues in Construction
CMgt 4021—Construction Planning and Scheduling
CMgt 4023—Construction Estimating
ABus 4101—Accounting and Finance for Managers

Liberal Education and Communication

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

Science and Engineering

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

Architecture

Proposed courses:

Arch 5501—Environmental and Material Forces in Architecture
Arch 5542—Building Energy Systems
Arch xxxx—Structural Frames and Building Design/Construction
Arch 55xx—Integrated Design Systems

Electives

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

Final Project/Internship

CMgt 4196—Construction Management Internship

Emergency Health Services

B.E.H.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 Principles of Biology or Introduction to Chemistry, Anatomy, Physiology, English Composition and Speech with a minimum GPA of 2.50. Contact the B.E.H.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

To complete the degree, 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

Students must complete at least 27 credits of core courses from the following:

EHS 4011—Concepts of Emergency Health Services
ABus 4031—Accessing and Using Information Effectively
PubH 5170—Theory and Practice of Occupational Health
EHS 4021—EMS Planning and Fiscal Management
ABus 4023—Communicating for Results
Phil 3305—Medical Ethics
PubH 5663—Cross-Cultural Health Issues
EHS 5031—Basic Principles of Research

Choose one course from this list:

ABus 4021, EPsy 5152, HRD 5302, PA 5131

In addition, students must choose a management track or education track of study.

Management Track

Students in the management track must complete at least 25 credits in the following courses:

ABus 4101—Accounting and Finance for Managers
ABus 4104—Management and Human Resources Practicum
OMS 3001—Introduction to Operations Management
PubH 5771—Health Care Financial Management
ABus 4012—Problem Solving in Complex Organizations
or OMS 3059—Quality Management
ABus 4022—Managing Organizational Relationships
or Mgmt 3001—Fundamentals of Management
Practicum in the management track

Choose 3 or more credits of elective courses, chosen in consultation with a B.E.H.S. adviser.

University College
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.

Education Track

Students in the education track must 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

Choose one course from: BIE/HRD 5601, EPsy 5231, or EPsy 5221

Practicum in education track

Three or more credits of elective courses, chosen in consultation with a B.E.H.S. adviser.

Final Project

Students must complete an arranged practicum in the selected track.

Information Networking

B.I.N.

The Bachelor of Information Networking (B.I.N.) 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 and other professional career tracks related to information networking.

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.

Degree Requirements

To complete the degree, students must complete at least 123 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 B.I.N. come from other programs and departments, such as computer science, and electrical and computer engineering. Students must complete 96 credits from the following:

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

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

Spch 1101—Introduction to Public Speaking

or Rhet 1223—Oral Presentations in Professional Settings

or Rhet 3257—Scientific and Technical Presentations)

ABus 4023—Communicating for Results

ABus 4021—Small Group Behavior and Teamwork

ABus 4043—Project Management in Practice

Acct 2050—Financial Reporting

Psy 1001—Introduction to Psychology

Econ 1101—Principles of Microeconomics

or Econ 1102—Principles of Macroeconomics

Stat 3011—Introduction to Statistical Analysis

EE 3005—Fundamentals of Electrical Engineering

EE 3006—Fundamentals of Electrical Engineering Laboratory

CSci 1901—Structure of Computer Programming I

CSci 1902—Structure of Computer Programming II

CSci 2021—Machine Architecture and Organization

CSci 2011—Discrete Structures of Computer Science

CSci 4061—Introduction to Operating Systems

CSci 4081—Introduction to Software Engineering

CSci 5211—Data Communications and Computer Networks

CSci 5212—Network Programming and Administration

CSci 5131—Internet Programming

IDSc 4153—Telecommunications: Domestic and International Policy and Regulation

IDSc 4102—Introduction to Information System Analysis

Final Project

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

Course Descriptions

This is A through H of the course section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

Accounting (Acct)	277	Emergency Health Services (EHS)	331	Microbiology (MicB)	384
Adult Education (AdEd)	278	English as a Second Language (ESL)	331	Middle Eastern Languages and Cultures (MELC)	385
Aerospace Engineering and Mechanics (AEM)	278	English: Creative Writing (EngW)	333	Military Science (Mil)	385
Aerospace Studies (Air)	280	English Language and Literature (EngL)	333	Modern Greek (MdGk)	386
Afro-American Studies (Afro)	280	English: Writing, Rhetoric, and Language (EngC)	335	Mortuary Science (Mort)	386
Agricultural Education and Extension (AgEE)	281	Entomology (Ent)	336	Museum Studies (MSt)	386
Agricultural Engineering Technology (AgET)	282	Environmental Science (ES)	337	Music (Mus)	387
Agricultural Industries and Marketing (AIM)	282	Family Education (FE)	337	Music Applied (MusA)	390
Agriculture (Agri)	283	Family Social Science (FSoS)	337	Music Education (MuEd)	393
Agronomy and Plant Genetics (Agro)	283	Finance (Fina)	338	Natural Resources and Environmental	
Akkadian (Akka)	283	Finnish (Fin)	339	Studies (NRES)	394
American Indian Studies (Amln)	284	Fisheries and Wildlife (FW)	339	Naval Science (Nav)	395
American Sign Language (ASL)	284	Food Science and Nutrition (FScN)	340	Neuroscience (NSc)	395
American Studies (AmSt)	285	Forest Resources (FR)	341	Norwegian (Nor)	396
Ancient Near Eastern (ANE)	285	French (Fren)	342	Nursing (Nurs)	396
Animal Physiology (AnPh)	286	French and Italian (Frit)	344	Operations and Management Science (OMS)	398
Animal Science (AnSc)	286	General College (GC)	344	Otolaryngology (Otol)	398
Anthropology (Anth)	287	Genetics and Cell Biology (GCB)	347	Pharmacology (Phcl)	398
Applied Business (ABus)	288	Geographic Information Science (GIS)	347	Pharmacy Practice (Phar)	398
Applied Economics (ApEc)	289	Geography (Geog)	347	Philosophy (Phil)	398
Arabic (Arab)	291	Geological Engineering (GeoE)	349	Physical Education (PE)	400
Aramaic (Arm)	291	Geology and Geophysics (Geo)	350	Physical Medicine and Rehabilitation (PMed)	401
Architecture (Arch)	291	German (Ger)	352	Physics (Phys)	402
Area Studies (Area)	293	German, Scandinavian, and Dutch (GSD)	354	Physiology (Phsl)	404
Art (ArtS)	294	Gerontology (Gero)	354	Plant Biology (PBio)	404
Art History (ArtH)	295	Greek (Grk)	354	Plant Pathology (PIPa)	405
Astronomy (Ast)	297	Hebrew (Hebr)	354	Polish (Plsh)	405
Biochemistry (BioC)	297	Hindi (Hndi)	355	Political Science (Pol)	405
Biology (Biol)	298	History (Hist)	355	Portuguese (Port)	408
Biomedical Engineering (BMEn)	299	History of Medicine (HMed)	361	Premajor Advising (PMA)	408
Biosystems and Agricultural Engineering (BAE)	300	History of Science and Technology (HSci)	361	Psychology (Psy)	408
Business Administration (BA)	300	Honors Colloquia (HCol)	362	Public Affairs (PA)	410
Business and Industry Education (BIE)	300	Honors Seminar (HSem)	362	Public Health (PubH)	413
Business, Government, and Society (BGS)	302	Horticultural Science (Hort)	362	Recreation, Park, and Leisure Studies (Rec)	415
Business Law (BLaw)	302	Human Ecology (HE)	363	Religions in Antiquity (RelA)	415
Cell Biology and Neuroanatomy (CBN)	302	Human Resource Development (HRD)	364	Religious Studies (RelS)	417
Central Asian Studies (CAS)	302	Human Resources and Industrial		Rhetoric (Rhet)	417
Chemical Engineering (ChEn)	302	Relations (HRIR)	364	Russian (Russ)	418
Chemistry (Chem)	303	Humanities (Hum)	365	Sanskrit (Skt)	419
Chicano Studies (Chic)	304	Industrial Engineering (IE)	366	Scandinavian (Scan)	419
Child Psychology (CPsy)	305	Information and Decision Sciences (IDSc)	366	Science in Agriculture (ScAg)	420
Chinese (Chn)	305	Institute of Technology (IoT)	367	Slavic (Slav)	420
Civil Engineering (CE)	306	Insurance (Ins)	367	Social Work (SW)	420
Classical Civilization (ClCv)	308	Interdepartmental Study (ID)	367	Sociology (Soc)	421
Classics (Clas)	308	Interdisciplinary Archeological Studies (InAr)	368	Soil (Soil)	423
Clinical Laboratory Science (CLS)	310	International Relations (IntR)	368	South Asian Languages and Cultures (SALC)	424
College of Liberal Arts (CLA)	310	Italian (Ital)	368	Spanish (Span)	425
College of Veterinary Medicine (CVM)	310	Japanese (Jpn)	369	Spanish-Portuguese (SpPt)	427
Communication Disorders (CDIs)	310	Jewish Studies (JwSt)	369	Speech-Communication (Spch)	427
Comparative Literature (CLit)	311	Journalism and Mass Communication (Jour)	370	Sport Studies (SpSt)	428
Comparative Studies in Discourse		Kinesiology (Kin)	372	Statistics (Stat)	428
and Society (CSDS)	311	Laboratory Medicine and Pathology (LaMP)	374	Sumerian (Sum)	429
Computer Science (CSci)	312	Landscape Architecture (LA)	374	Swedish (Swed)	429
Construction Management (CMgt)	313	Language, Teaching, and Technology (LgTT)	375	Teaching English as a Second Language (TESL)	429
Coptic (Copt)	314	Latin (Lat)	375	Theatre Arts (Th)	430
Cultural Studies and Comparative		Latin American Studies (LAS)	375	Toxicology (TxcI)	431
Literature (CSCL)	314	Learning and Academic Skills (LASK)	376	Translation and Interpreting (TrIn)	431
Curriculum and Instruction (CI)	315	Linguistics (Ling)	376	University College (UC)	431
Dance (Dnce)	315	Management (Mgmt)	377	Urban Studies (UrbS)	432
Danish (Dan)	316	Marathi (Mar)	377	Veterinary Pathobiology (VPB)	432
Dental Hygiene (DH)	316	Marketing (Mktg)	378	Water Resources Science (WRS)	432
Design, Housing, and Apparel (DHA)	317	Materials Science (MatS)	378	Women's Studies (WoSt)	432
Dutch (Dtch)	320	Mathematics (Math)	379	Wood and Paper Science (WPS)	434
East Asian Studies (EAS)	320	Mechanical Engineering (ME)	381	Work, Community, and Family	
Ecology, Evolution, and Behavior (EEB)	321	Medical Technology (MedT)	383	Education (WCFE)	435
Economics (Econ)	322	Medicinal Chemistry (MedC)	384	Youth Development and Research (YoSt)	436
Education and Human Development (EdHD)	323	Medieval Studies (MeSt)	384		
Educational Policy and Administration (EdPA)	325	Microbial Engineering (MicE)	384		
Educational Psychology (EPsy)	326				
Electrical Engineering (EE)	328				



Course Descriptions

For definitions of course numbers, symbols, and abbreviations, see the inside back cover.

Accounting (Acct)

Department of Accounting

Curtis L. Carlson School of Management

Acct 2050. Introduction to Financial Reporting.

(4 cr; QP–Completion of 40 cr; SP–Completion of 26 cr; 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. Application of costing methods to determining costs of products, services, and production processes. Use of costs in operating and strategic decisions. Development of budgeting and performance evaluation.

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–3201, #; SP–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 I.

(4 cr; SP–Minimum grade of B- in 1050; A-F only)
Valuation, measurement, and reporting issues related to selected assets and liabilities of the firm. Students learn theory underlying accounting issues and become technically proficient in 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, acct major; SP–5101, acct major; 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–5101; 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 cr. 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–1050, MBT student; SP–2050, MBT student; 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, acct or finance major; SP–5100 or 5101, acct or finance major; A-F only)
Interpretation and analysis of financial statements. Introduces basic techniques of financial statement analysis and applies them in different settings such as investment and cr 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–5135, MBT student; SP–5135, MBT student; 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–5135, MBT student; SP–5135, MBT student; 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–5135, MBT student; SP–5135, MBT student; 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 Entities.

(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)

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 governmental 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 U.S.

Acct 5320. Current Topics in Accounting.

(2 cr; QP–5102, acct major; SP–5102, acct major; A-F only)
Selected topics in accounting. Topics vary each semester.

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 cr 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 cr.

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 cr 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 each semester. 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 5001. Survey: Human Resource Development and Adult Education. (3 cr; SP-§HRD 5001) 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; SP-§HRD 5611) Exploration of the implications of future developments in several areas of theory and practice in human resource development and adult education.

AdEd 5612. Managing and Consulting in Human Resource Development and Adult Education. (3 cr; SP-§HRD 5612; 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-Phys 1251 or equiv, Math 3252, IT student; SP-Phys 1301 or equiv, IT student, ¶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-1015, Math 3261, IT student; SP-2011, IT student, ¶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-Phys 1251 or equiv, Math 3252, Math 3261, IT student; SP-Phys 1301 or equiv, IT student, ¶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-Math 1261, Phys 1252, IT student or Δ; SP-Math 1272, Phys 1301, IT student; 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-1015, Math 3252, Math 3261 or equiv, IT student; SP-2011 or 2021, Math 2263 or equiv, IT student, ¶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 space mobile, 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-3036, Math 3252, Math 3261, IT upper div or graduate student or Δ; SP-2012, Math 2243, Math 2263, IT upper div or grad student; 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-5200, upper div IT or grad student or Δ ; SP-4201, upper div IT or grad student)

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-5204, ME 3301, IT upper div or grad student or Δ ; SP-4202, ME 3324, IT upper div or grad student)

Basic one-dimensional flows: isentropic, area change, heat addition. Overall performance characteristics of propellers, ramjets, turbojets, turbofans, rockets. Performance analysis of inlets and exhaust nozzles, compressors, burners, turbines. Rocket flight performance, single- and multistage chemical rockets, liquid and solid propellants. Homework includes design problems. Design project with technical report.

AEM 4243. Advanced Aerodynamics. (3 cr; QP-5206, IT upper div or grad student or Δ ; SP-4202, IT upper div or grad student)

Interaction between pressure distribution and boundary-layer growth on air foils of arbitrary shape. Inviscid flow past non-planar wings of specified planform.

AEM 4245. Hypersonic Aerodynamics. (3 cr; QP-5204, upper div IT or grad student or Δ ; SP-4202, upper div IT or grad student)

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-5200 or equiv, CSci 3101 or equiv, IT upper div or grad student, Δ ; SP-4201 or equiv, CSci 1107 or equiv, IT upper div or grad student)

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-3036, Math 3261, or equiv, IT upper div or grad student or Δ ; SP-2012, Math 2243 or equiv, IT upper div or grad student)

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-3005, IT upper div or grad student, or #; SP-2301, IT upper div or grad student 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-3401 or equiv, IT upper div or grad student, Δ ; SP-4303 or equiv, IT upper div or grad student)

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-3005, AEM sr or #; SP-2301, AEM sr 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 4332. Aerospace Vehicle Design II. (4 cr; QP-Comp 1011 or equiv, 5329 or #; SP-EngC 1011 or equiv, 4331 or #)

Students work in teams to design aerospace vehicle: schedules/milestones/critical-path, trade studies, weight and balance, propulsion, trajectory analysis, controls, CAD/vehicle integration, drawings and specifications, fabrication with CAD/CAM, test matrix, structural analysis and testing, stress/strain and displacement measurements, wind tunnel/water channel testing, flight testing, certification/ethics. Status reports, written report, oral presentation. Writing intensive course.

AEM 4351. Aerodynamic Decelerator Systems.

(3 cr; QP-3036, 5300, IT upper div or grad student or #; SP-2012, 2301, IT upper div or grad student) 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-5206, IT upper div or grad student or #; SP-4202, IT upper div or grad student)

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-3401, 3016, IT upper div or grad student or #; SP-4301, 3031, IT upper div or grad student)

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-3016 or equiv, IT upper div or grad student or #; SP-3031 or equiv, IT upper div or grad student; 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-C or better in 5515, IT upper div or grad student or #; SP-C or better in 4501, IT upper div or grad student 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-3016, IT upper div or grad student or #; SP-3031, IT upper div or grad student) 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-3016, Math 3252, Math 3261, IT upper div or grad student or #; SP-3031, Math 2243, Math 2263, IT upper div or grad student)

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-EE 3005, EE 3006, EE 3009, CSci 3101, IT upper div or grad student or #; SP-EE 3005, EE 3006, CSci 1107, IT upper div or grad student)

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 4602. Aeromechanics Laboratory. (4 cr;

QP-5200, 5515, IT upper div or grad student or #; SP-4201, 4501, 4601, EngC 1011 or equiv, IT upper div or grad student)

Experimental methods and design in fluid and solid mechanics. Wind tunnel and water channel experiments involving flow visualization, pressure, velocity, force measurements; measurement of stresses, strains, displacements in solids and structures, including stress concentrations, aerospace materials behavior, and structural dynamics; computerized data acquisition and analysis, error analysis, data reduction techniques; experiment design. Written and oral lab reports. Writing intensive course.

AEM 4651. Aeroelasticity. (3 cr; QP-3401, 5206, IT upper div or grad student or #; SP-4301, 4202, IT upper div or grad student)

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 4822. 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-3036, Math 3261, IT upper div or grad student; SP-2012, Math 2243, IT upper div or grad student)
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-3016, Math 3261, IT upper div or grad student or #; SP-3031, Math 2243 or equiv, IT upper div or grad student 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-5515 or equiv, Math 3252, IT upper div or grad student 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 (Air Force ROTC)

Student Development & Athletics

Air 1000. Leadership Laboratory. (1 cr; S-N only)
Air Force customs and courtesies, drill and ceremonies, military commands, the environment of the Air Force officer, and learning about areas of opportunity available to commissioned officers. Interviews, guidance, and information to increase the understanding, motivation, and performance of other cadets.

Air 1104. Introduction to the Air Force Today I. (1 cr; A-F only)
Mission and organization of the Air Force, officership and professionalism, military customs and courtesies, Air Force officer opportunities, group leadership problems, and introduction to communication skills.

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

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

Air 1205. Quality Air Force, Group Leadership Problems, and Presentation Techniques. (1 cr; A-F only)
Leadership and followership. Officership, ethics, and values; Air Force's core values. Air Force heritage and leaders, Quality Air Force, group leadership problems, and continuing application of communicative skills.

Air 3301. Air Force Leadership, Quality, and Communication. (3 cr; A-F only)
Study of leadership, quality management fundamentals, and communication skills required of an Air Force junior officer. Case studies.

Air 3302. Air Force Officership, Quality, and Communication. (3 cr; 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 and African Studies
College of Liberal Arts*

Afro 1011. Introduction to African American Studies. (3 cr)
The study of peoples of African descent including the evolution of African American culture, comparative race relations, feminism and social policy change.

Afro 1021. Introduction to Africa. (3 cr)
Diverse themes and disciplines in African Studies from prehistory to post-colonial period. Introduction to methodologies of inquiry.

Afro 1221. Beginning Swahili. (4 cr)
Introduction to basic skills: comprehension, speaking, reading and writing.

Afro 1222. Beginning Swahili. (4 cr; 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 and histories of states. Relations with North Africa, Mediterranean, Asian, and American worlds. Examination of 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-One 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 3251. Sociological Perspectives on Race, Class, and Gender. (3 cr; A-F only)
Race, class, and gender as aspects of social identity and 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.

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 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.

Afro 3543. Psychology and the Black American Experience. (3 cr)
Historical and contemporary perspectives of the relationship between the area of psychology and African Americans 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 18th 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. (4 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)

Discussion of internal migrations, industrialization and unionization, the Great Depression, world wars, and large scale movements for social and political change.

Afro 3910. Topics in Afro-American and African Studies. (3 cr)

Topics specified in *Class Schedule*.

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–#, Δ, □)

Guided individual research and study.

Afro 4001. Seminar: History of Women in South Africa. (3 cr)

The changing role and status of women in South Africa from precolonial era to the present, and relationships to political, social, and economic development.

Afro 4013. Cities in Africa: African, Islamic, European Traditions. (3 cr)

History of African cities, their common and unique features. Case study of Swahili cities. Roots and issues of 20th century urban growth.

Afro 4231. The Color of Public Policy: African Americans, American Indians, and Chicanos in the U.S. (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 4302. Honors: Women's Autobiographical Narratives. (3 cr; QP–Sr or grad student or #; SP–Sr or grad student or #)

Focus is on literary autobiography, journals, travel narratives, essays, slave narratives, testimonials, and ethnographies to consider the content and the methodological, theoretical, and aesthetic issues of the construction and production of women's experience.

Afro 4432. Colloquium: Before the Field: Internships, Community Service, and Study Abroad. (3 cr)

Theoretical and practical preparation for internships, community work, and study abroad.

Afro 4622. Caribbean Writers and Identity. (3 cr)

Examination of literary and historical issues explored by Caribbean writers in English, French, and Spanish-speaking Caribbean through autobiographies, short stories, novels, and films.

Afro 4632. Black Francophone Writers in Translation. (3 cr)

Exploration of ideas, particularly negritude and issues of creoleness, central to male and female writers in French from Africa and the Caribbean. Novels, essays, short stories, and plays.

Afro 4800. African Studies Seminar. (3 cr)

Topics vary and reflect instructor's research interests. Topics specified in *Class Schedule*.

Afro 4900. Afro-American Studies Seminar. (3 cr)

Topics specified in *Class Schedule*.

Afro 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.

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 student 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 5678. Seminar: African-Arabic Fiction in Translation. (3 cr)

African fiction in Arabic including works of Barrada, Idris, Mahrouz, al-Matwi, El-Saadawi and el-Zayat. Emphasis on 20th century. Tests discussed in historical and cultural context. Theoretical and critical essays. All readings in English.

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 3004, jour major or minor, Δ; SP–Jour 3004, jour major or minor, Δ; 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)

Topics specified in *Class Schedule*.

Afro 5993. Directed Study. (1-3 cr; SP–#)

Guided individual reading/study for qualified seniors and graduate students.

Agricultural Education and Extension (AgEE)

Department of Work, Community, and Family Education

College of Education and Human Development

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 3112. Technical Drawing and Production Technologies. (3 cr; SP–\$BIE 3112; 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.

AgEE 3121. Communication, Energy and Power, Transportation and Machinery Technologies. (3 cr; SP–\$BIE 3121; 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 5220. Special Topics in Agriculture Education and Extension. (1-3 cr [max 12 cr])
Content varies by offering.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 5341. Global Program Delivery Techniques and Technology of Extension. (2 cr; SP–\$WCCE 5341; 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.

AgEE 5351. Methods for Change in Developing Countries. (3 cr; SP–\$WCCE 5351; 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.

AgEE 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.

AgEE 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.

AgEE 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.

AgEE 5995. Integrating Paper—Master of Education: Agricultural and Extension Education. (1-4 cr; A-F only)
Students prepare a 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 student in IT or COAFES or PubH or other major with interest in occupational and environmental health and safety; SP–Jr or sr or grad student 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 topics in Biosystems and Agricultural Engineering offered in locations other than the Twin Cities campus. Consult *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. (2 cr) Topics change each semester. Check the *Class Schedule* or college office for additional information.

Agri 3000. Seminar in International Agriculture. (2 cr [max 6 cr]; QP—#; SP—#; A-F only) Oral presentations and discussion of students' research papers, literature review of selected topics, and discussions with students and staff about their experiences in international agriculture.

Agri 3101. Honors Experience. (2 cr [max 2 cr]; QP—Approved proposal by COAFES honors program committee; SP—Approved proposal by COAFES honors program committee; A-F only) Developed by student in conjunction with a COAFES faculty mentor. Could include foreign study-travel, research experience, a position or policy paper, or any experience demonstrating advanced study/service/understanding.

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. Topics include plant identification, plant physiology, plant breeding and biotechnology, plant ecology, and crop culture and management.

Agro 2103. Grain Grading and Crop Utilization. (1 cr; SP—#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, SP—Biol 1009 or equiv, #Ent 3001, #PIPa 3002 required) Introduction to the principles of the biological, physical, and agricultural sciences that underlie the practice of integrated weed management.

Agro 3005. Applied Crop Physiology and Development. (2 cr [max 2 cr]; QP—8 cr of Biol, Chem 1001, Chem 1051 or equiv; SP—8 cr Biol or plant science, Chem 1011, Chem 1021 or equiv, #Biol 3002 required) Applications of plant physiology to growth, development, and management of field crops. Explore effects of environment, management practices, plant morphology, and anatomy on physiological processes. Inquiry and group activities emphasized.

Agro 3203. Environment, Global Food Production, and the Citizen. (3 cr; QP—Biol 1009 or equiv; SP—\$AnSc 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 uses decision cases, discussions, videos and 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. Interpretation procedures include inductive and deductive reasoning, analysis of data, tests of significance, and treatment comparisons. Computers used for data processing and statistical analysis.

Agro 4103. World Food Problems. (3 cr; QP—\$ApEc 5790, \$CAPS 5280, \$FScN 5643, jr or sr or grad student; SP—\$ApEc 4103, \$CAPS 4103, \$FScN 4103; jr or sr or grad student) 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. Agroecosystems 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 on 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) Part of intensive summer workshop at selected Minnesota Agricultural Experiment Stations. A field based, hands-on course emphasizing problem solving and diagnostic strategies, and updates about crops and crop problems in Minnesota. Extra course fees.

Agro 4605. Management Technologies for Crop Production. (3 cr; QP—Jr or sr or grad student with program committee approval; SP—Jr or sr or grad student 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 completed or #) Linked to undergraduate internship and other experiential learning opportunities. Problem-based learning and decision-centered cases help students reflect on experience from an ethical, technical, societal and personal perspective.

Agro 4888. Issues in Sustainable Agriculture. (2 cr; QP—1010, Soil 1020 or Soil 3125 or equiv; SP—1103, Soil 1125 or Soil 2125 or equiv) Agroecology, sustainable practices, production economics, environmental quality, holistic resource management, healthy foods and water, and rural communities. Introduces sustainable agricultural advocates including farmers, faculty, and representatives of nonprofit 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 who will benefit from a basic understanding of how genetics is applied to plant improvement. Emphasis on sustainable production scenarios.

Agro 5310. Research Methods in Crop Improvement and Production. (1 cr; QP—Agro or Hort or PIBr grad student; SP—Applied Plant Sciences grad student; 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 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 undergrad with # or grad student) 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 Course Schedule.

American Indian Studies (Amln)

*Department of American Indian Studies
College of Liberal Arts*

Amln 1001. Introduction to American Indian Studies. (4 cr)
Concepts and topics covered include history, language, culture, literature, federal policy, images, contemporary issues, and the arts. Minnesota Indians will be emphasized where appropriate.

Amln 1101. Beginning Ojibwe I. (4 cr)
Acquisition of speaking skills, fundamentals of grammar, and writing systems.

Amln 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-1102)
Improving speaking skills; grammatical structures; storytelling, oral history, and translation projects.

Amln 3104. Intermediate Ojibwe II. (4 cr; SP-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-3123)
Further development of the listening, speaking, reading, and writing skills with oral drills and in class participation focused on questions and answers.

Amln 3201. American Indian Literature. (3 cr)
Comparative studies of oral traditions and modern literature from a variety of 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 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 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 18th and early 20th centuries.

Amln 4201. Topics in American Indian Literature. (3 cr)
Topics may be organized around issues of theme, genre, region or tribe, gender, etc. For upper division undergraduate majors, non-majors, and graduate students.

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

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. Change and Development in Indian Communities. (3 cr; QP-1771; SP-1001)
Sources, nature, and consequences of social and economic development and change in Indian communities. Precontact Indian communities; impact of European contact; social movements into the 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 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 Euramericans.

Amln 4990. Topics in American Indian Studies. (3-4 cr)

Amln 4991. Independent Study. (1-12 cr [max 18 cr]; SP-#, Δ, □)

Amln 4994. Directed Research. (1-12 cr [max 18 cr]; QP-#, Δ, □; SP-#, Δ, □)
Individually arranged research with faculty to meet student needs and interests.

Amln 4996. Field Study. (1-12 cr [max 18 cr]; QP-#, 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.

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 finger spelling; and deaf culture.

ASL 1702. American Sign Language II. (4 cr; QP-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 U.S.; receptive and expressive activities; sign vocabulary; grammatical structure; receptive and expressive finger spelling and aspects of deaf culture.

ASL 3703. American Sign Language III. (4 cr; QP-EPsy 1603 or #; SP-1702 or #)
Expanded instruction of American Sign Language (ASL). Receptive and expressive activities; sign vocabulary; grammatical structure; receptive and expressive finger spelling; narrative skills; cultural behaviors; and aspects of deaf culture. Abstract and conversational approach.

ASL 3704. American Sign Language IV. (4 cr; QP-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 finger spelling; 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]; QP-Fluency in ASL or #; SP-Fluency in ASL or #; S-N only)
American Sign Language (ASL) form and function, vocabulary production and other ASL grammatical features needed by professionals working with children; storytelling strategies and technical sign language for classroom teachers. Content progresses in repeated segments.

American Studies (AmSt)

Program in American Studies College of Liberal Arts

AmSt 1001. American Cultures: Native America to Industrialization. (4 cr)

Interdisciplinary study of American society from precontact to industrialization; exploring American literature, art, music, and popular culture in historical context.

AmSt 1002. American Cultures: 20th-Century America. (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 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 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 3113. 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 3252. 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 3253. 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 3299. 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 3301. 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 3302. 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 4101. Gender, Sexuality, and Politics in America. (3 cr; A-F only)

Ways public and private life intersect through the issues of gender, sexuality, family, politics, and public life; ways in which racial, ethnic, and class divisions have been manifest in the political ideologies affecting private life.

AmSt 5101. Religion and American Culture. (3 cr; A-F only)

Role of religion in shaping contemporary American cultural pluralism. Institutions and processes, intellectual frameworks, aesthetic and symbol systems that form religious communities and contribute to religious conflicts in U.S. society and culture.

AmSt 5202. Thought and Practice of American Religions. (4 cr)

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; 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 3002. 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 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)

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. Period of 2nd millennium B.C.

ANE 3502. Ancient Israel: The History of Israel From Conquest to Exile. (3 cr; SP-Knowledge of Hebrew not required; 3501 recommended)

Israelite history in the context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focus on issues raised by archaeological data related to the Israelite conquest of Canaan.

ANE 3503. 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 3504. History and Development of Israelite Religion II. (3 cr; SP-Knowledge of Hebrew not required)

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: The History of Israel From Conquest to Exile. (3 cr; SP-Knowledge of Hebrew not required; 5501 recommended)

Israelite history in the context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focus on issues raised by archaeological data related to the 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. Knowledge of Hebrew not required.

ANE 5504. History and Development of Israelite Religion II. (3 cr; SP-Knowledge of Hebrew not required)

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 Physiology (AnPh)

Graduate School

AnPh 4151. Research Topics in Neuroscience. (3 cr; SP–\$Biol 4151, \$Phsl 4151; Biol 3211, BioC 3021 or #; A-F only)

Advanced discussion of selected neuroscience topics, primarily for undergraduates majoring in neuroscience or physiology. Survey and methods of neuroscience, including genetics, physiology, and behavior. Neurodevelopment, neurochemistry or molecular neuroscience, sensory systems, motor control, and behavioral neuroscience.

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 2211. Biometrics for Livestock. (3 cr; QP–Math 1031 or higher; SP–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 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 3203. 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. (4 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 interrelationships 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.

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-4609; 5601; SP-4609; 4601)
Analysis of pork production systems using case studies and visits to modern pork production operations.

AnSc 4613. Advanced Beef Production Systems Management. (2 cr; QP-4609; 5603; SP-4609; 4603)
Analysis of beef production systems using case studies and visits to beef cow-calf operations and feedlots.

AnSc 4614. Advanced Dairy Production Systems Management. (2 cr; QP-4609; 5604; SP-4609; 4604)
Analysis of dairy production systems using case studies and visits to actual dairies.

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 1003. 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 1011. Human Evolution: Honors. (4 cr; QP-Honors student; SP-Honors student)
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 1013. Understanding Cultures: Honors. (4 cr; SP-Honors student)
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 3001. Introduction to Archaeology. (3 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, 3003 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. (3 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. Native Peoples of North America. (3 cr)
A survey of cultural developments among native peoples of North America in historic times and the present day.

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 include economy, development, 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 include 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 3027. 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 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 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 3047. 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, #)
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 adviser, and developing preliminary bibliography. Normally completed at least two semesters before graduation.

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 4003. Contemporary Perspectives in Cultural Anthropology. (3 cr; SP-1003, Jr or #; A-F only)
Explores the concept of culture and the practice of fieldwork as they relate to various social institutions. Examines anthropological perspectives on race, ethnicity, and gender.

Anth 4011. Senior Seminar. (3 cr; SP-Sr major; A-F only)
Research seminar. Topics and research methodologies differ according to staff and student interests. Students complete a 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 student 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 4023. Culture Theory. (3 cr; SP–Jr or sr or grad student 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. Examines problems in ethnographic practice, analysis, and writing by focusing on several classic monographic examples and associated theoretical writing.

Anth 4031. Applied Anthropology. (3 cr; SP–1003 or 4003 or grad student 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 student)
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 student)
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 student)
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 student)
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 student)
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 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 4994. 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 5025. Cultural Semantics. (3 cr)
Understanding cultures and cognitive classification systems through lexical semantics.

Anth 5027. 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 student 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 student 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 student 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 student or #)
Anthropological approaches to urban life in Western and non-Western settings. Topics include social networks and voluntary organizations; class, ethnicity, gender and power; migration and immigration; urban labor and economics; and urban “problems.”

Anth 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.

Applied Business (ABus)

University College

ABus 4011. Historical Perspectives and Contemporary Business Challenges. (3 cr; OP–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; A-F only)
Open systems perspective. Emphasis on analyzing root causes and effects of problems and solutions across boundaries in the organization. Process analysis as problem-solving tool. Commonly used problem-solving frameworks or processes. Techniques for conducting root cause analyses, expanding alternatives, predicting consequences, and 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. (2 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 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—#; SP—#; A-F only)

Exploratory data analysis, visual display of data, and basic mathematical and statistical analysis techniques. Decision theory and 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—Operations mgmt or small business mgmt course or #; SP—Operations mgmt or small business mgmt course or #; A-F only)

Tools and techniques for scheduling, coordinating, and allocating resources. Field project with a nonprofit organization in the community, smaller business, or the student's employing organization. Project should be carried out in a team if possible.

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 principles of accounting courses or #; SP—Two principles of accounting courses or #; A-F only)

Expands on students' lower division work in financial accounting and adds principal concepts of finance. Emphasis is on business decision making from an accounting and financial perspective, including topics such as analysis of cost-volume-profit relationships, capital budgeting, variances, uses and sources of funds, and valuation.

ABus 4102. Operations in Manufacturing and Service Businesses. (3 cr; QP—Business operations or small business mgmt course or #; SP—Business operations or small business mgmt course or #; A-F only)

Concepts and principles related to the management of operations functions, including operations strategy, process, design, just-in-time, forecasting, inventory management, principles of scheduling, and quality improvement. Taught from service and manufacturing perspectives and stresses the relationships between operations and the environment.

ABus 4103. Marketing and Sales. (3 cr; QP—Intro to marketing or intro to sales course or #; SP—Business operations or small business mgmt course 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 an integral part of the overall distribution system, emphasizing 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 4901. Special Topics in Applied Business. (3 cr; SP—Minimum of seven BAB courses recommended; A-F only)

Content changes periodically to cover important topics not currently covered in the ABus curriculum. May include various management issues in a changing workplace.

ABus 4999. Practicum. (3 cr; QP—ABus student, minimum of 33 ABus cr, completed portfolio review, #; SP—ABus student, minimum of 33 ABus cr, completed portfolio review, #; A-F only)

May involve project in the student's employing organization; project in an organization providing an internship; integration of projects drawn from previous coursework; or development of a business plan for a new venture or expansion of an existing business. Students meet in scheduled class sessions on limited basis.

Applied Economics (ApEc)

Department of Applied Economics

College of Agricultural, Food, and Environmental Sciences

ApEc 1001. Orientation to Applied Economics. (1 cr; S-N only)

Introduction to applied economics and agricultural and food business management majors and the Department of Applied Economics, faculty, policy and procedures; career opportunities; resources in the department and college.

ApEc 1101. Principles of Microeconomics. (3 cr)

Theory of the household and firm; demand and supply; price determination; government in the market; market structures; agriculture and food; externalities and the environment; labor markets and unions; capital and interest; project evaluation; human capital.

ApEc 1102. Principles of Macroeconomics. (3 cr)

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 and Markets. (3 cr; QP—ApEc/Econ 1101, Math 1142 or Math 1251, BA 1550 or Stat 1001; SP—ApEc/Econ 1101, Math 1142 or Math 1251, BA 1550 or Stat 1001)

Intermediate price theory, consumer demand, and marketing. Theory and application of demand analysis. First part of a sequence with 3002.

ApEc 3002. Applied Microeconomics: Managerial Economics. (3 cr; QP—3001, 1250 or Acct 1050 or #; SP—3001, 1251 or Acct 2050 or #)

Microeconomic theory and its application to managerial problems. Integrates theory and applications on special topics: production functions, cost analysis, linear programming, market structure, pricing policy, risk analysis, and capital budgeting.

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 3041. 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 3311. 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. (2 cr; QP-3400 or #; SP-¶3401)
Economic relationships in the marketing of grain and grain products; grain grades, storage and transportation; market structure, channels, pricing, and competition; government programs and policies.

ApEc 3421. Livestock and Meat Marketing Economics. (2 cr; QP-3400 or #; SP-¶3401)
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; 1101 or #)
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 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 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 student; SP-§Agro 4103, §CAPS 4103, §FScN 4103; jr or sr or grad student)
A multidisciplinary 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 4501. 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 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 4821. 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-¶Econ 5151 or #)
Quantitative techniques for analysis of economic problems of firms and households. Links between quantitative tools and economic analysis developed to understand economic theory and develop research skills. Quantitative tools include regression analysis, mathematical programming, and present value analysis.

ApEc 5152. Applied Macroeconomics: Income and Employment. (2 cr; 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 #; A-F only)
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. Intermediate Market and Price Analysis. (3 cr; QP-3001 or equiv, Math 1142 or equiv; SP-3001 or equiv, Math 1142 or equiv; A-F only)
Development of analytical models and their application in various market situations. Study of unique market institutions in agriculture that have been developed in response to marketing and pricing problems.

ApEc 5481. 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 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 student or #; SP-Sr or grad student 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 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 and African Studies

College of Liberal Arts

Arab 1101. Beginning Arabic. (4 cr)
For students with no previous training in Arabic. Oral practice, reading, comprehension and basic grammar.

Arab 1102. Beginning Arabic. (4 cr; SP–1101 or equiv or #)
Continuation of Afro 1101. Comprehension, oral practice and reading of standard Arabic.

Arab 1201. Colloquial Arabic. (4 cr)
Intended primarily for business persons and travelers. Fundamentals of vocabulary and sentence structure, and introduction to Arabic script.

Arab 1202. Colloquial Arabic. (4 cr; SP–1201 or #)
Intended primarily for business persons and travelers. Fundamentals of vocabulary and sentence structure, and introduction to Arabic script.

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 the medical and natural sciences, mathematics, philosophy, literature, and their transmission to Europe.

Arab 3524. Introduction to the Qur'an. (3 cr)
Discussion of textual, thematic, interpretive, and narrative aspects of the Qur'an and its influence on modern Arabic literature. All reading in English.

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 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 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 5036. Islam: Religion and Culture. (3 cr; SP–\$Afro 3036)
Religion of Islam, faith, practices, sectarian splintering, expansion outside original home to status of world religion, institutions, status in world societies—Asia, Europe, Americas.

Arab 5101. Advanced Arabic I. (4 cr; SP–Arab 3102 or equiv or #)
Advanced readings in classical and modern Arabic. Compositions based on texts.

Arab 5102. Advanced Arabic II. (4 cr; SP–Arab 5101 or #)
Continuation of Arab 5101. Readings of Arabic texts, and writing compositions based on texts.

Arab 5491. Classical Islamic Civilization. (3 cr; SP–\$Afro 3036)
Islamic legacy in the classical age (800–1400) including the medical and natural sciences, mathematics, philosophy, literature, and their transmission to Europe.

Arab 5501. Modern Arabic Poetry in Translation. (3 cr)
The free verse movement and its major trends: post-romantic, social realist, symbolist, resistance, and prose poem. Emphasis on leading poets such as al-Mala'ika, al-Sayyab, al-Bayati, and Adunis. Theoretical and critical essays. All readings in English.

Arab 5502. The Arabic Novel in Translation. (3 cr)
The novel as a new genre in Arabic literature. Trends: realist, psychological, existentialist, feminist, post-modernist, fantastic, and experimentalist. Emphasis on major writers such as Mahfouz, Ghanem, Salih, Jabra, El Sa'dawi, Munif and Khouri. Theoretical and critical essays. Cultural and historical context.

Arab 5503. Arabic Drama in Translation. (3 cr)
Emergence and development of drama as a European-inspired genre in Arabic literature. Emphasis on major trends and playwrights. All readings in English.

Arab 5505. Survey of the Middle East. (3 cr; SP–\$Arab 3505, \$Hist 3505, \$MELC 3505)
Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present.

Arab 5541. Islam in the Catholic Age: Arab Phase 600 A.D. to 900 A.D. (3 cr; SP–\$Arab 3541)
The rise of Islam in its Arabian setting. Roles of the prophet, the Orthodox and Umayyad Caliphs. Development of the Islamic state and empire. Status of Muslims and non-Muslims.

Arab 5542. Medieval Islam. (3 cr; SP–\$Arab 3542)
Islamic dynasties, Mamluks and Mongols, and Crusaders and Assassins. Abbasid Caliphate's disintegration and rise of Seljuk Turks.

Arab 5543. Arabs Under Mamluks and Ottomans: 1300–1920. (3 cr; SP–\$Arab 3543)
Struggle against Crusaders and Mongols. Disintegration and reemergence under Muhammad Ali of Egypt; dynastic struggles in Syria; rise of Young Turks; Arab revolt.

Arab 5544. Arab World: 1920 to the Present. (3 cr; SP–\$Arab 3544)
Struggle in the Arab world for independence and its course since independence. Emphasis on development, political stability and unity; political structures; the Arab-Israeli conflict.

Arab 5900. Topics in Arabic Literature and Culture. (3 cr [max 9 cr]; SP–5102 or #)
Readings and discussion of selected works in Arabic. Topics specified in *Class Schedule*.

Arab 5992. Directed Readings. (1–3 cr; SP–#)
Individual research and readings for advanced students.

Aramaic (Arm)

Department of Classical and Near Eastern Studies
College of Liberal Arts

Arm 5011. Biblical Aramaic and Old Aramaic Inscriptions. (3 cr; SP–One yr Hebrew or Arabic or #)
Biblical Aramaic—grammar, fluency in reading Biblical Aramaic and Old Aramaic inscriptions.

Arm 5012. Syriac. (3 cr; SP–One yr Hebrew or Arabic or #)
Emphasis on fundamentals of grammar and reading Syriac texts fluently.

Architecture (Arch)

Department of Architecture
College of Architecture and Landscape Architecture

Arch 1301. Introduction to Drawing in Architecture and Landscape Architecture. (3 cr; A-F only)
Development of basic skills involved in perceiving and representing the material environment. Study of sketching and drawing conventions of visual phenomena and forms.

Arch 1401. The Designed Environment. (3 cr; A-F only)
Examination of seminal issues in the designed environment, including relationships between place and space, and realms of the ideal and real, public and private. Survey of how the fields of architecture, landscape architecture, and urban design have explored those issues.

Arch 3301. Drawing for Design in Architecture. (3 cr; SP–Arch 1301 or LA 1301, BA Arch or BED major or #; A-F only)
Introduction to the conceptual function of drawing in architecture. Includes history of drawing in architecture, critical review of drawing conventions and systems, and exploration of drawing processes.

Arch 3401. Environmental Design and the Sociocultural Context. (3 cr; SP–1401 or LA 1401 or #)
The designed environment as a cultural medium and product of a sociocultural process and expression of values, ideas, and behavioral patterns. Study of design and construction as a complex political process.

Arch 3411. Architectural History to 1750. (3 cr)
History of architecture and city planning from antiquity to 1750, as illustrated by major monuments from western and non-western cultures.

Arch 3412. Architectural History Since 1750. (3 cr)
History of structure, cities, sites, and theories of architecture and urbanism since 1750.

Arch 3490. Honors Theory Seminar. (3 cr; SP–CLA or BA Honors student or #)
Contemporary issues in the literature of architecture; specific buildings or building types; or areas of architectural thought, history, representation, design, technology. Limited to 12 students. Topics, selected by faculty from their area of scholarship, will be announced in the *Class Schedule* the semester before being offered.

Arch 3993. Directed Study. (1–3 cr; SP–# only)
Guided individual reading or study.

Arch 5123. Architectural Thesis. (8 cr; SP–5122, 5241, BA Arch major; students must submit thesis plan in semester prior to writing thesis; A-F only)
Student's choice, study and solution of an architectural problem to demonstrate proficiency in all phases of design.

Arch 5241. Principles of Design Programming. (3 cr; QP–For undergrads 5122, B Arch major; for grads 8257, M Arch major or #; SP–For undergrads 5122, BA Arch major; for grads 8255, M Arch major or #; A-F only)
Concepts and techniques of architectural programming, including space and activity analysis, site selection, precedent study, code review,

appropriate technology identification, hypothesis formulation and evaluation. Emphasis on conceptual development, research, and analytic drawing.

Arch 5281. Undergraduate Architecture Studio I. (6 cr; SP-3411, 3412, BA Arch major or #; A-F only)
Exploration of architectural questions found in settlement patterns and the architectural elements found in their formal organization. Study of mapping techniques, orthographic projections, analytic drawing, and models.

Arch 5282. Undergraduate Architecture Studio II. (6 cr; SP-5281, Arch major or #; A-F only)
Exploration of human response to the natural forces of gravity, light, and air and their influence on the organization of material form to create places of human habitation.

Arch 5291. Undergraduate Architecture Studio III. (6 cr; SP-# only; A-F only)
Selected architectural problems developed by appointed faculty to deepen and enrich architectural ideas introduced in the required architectural studio sequence.

Arch 5292. Undergraduate Architecture Studio IV. (6 cr; SP-# only; A-F only)
Architectural problems with emphasis on development of structures as an integral part of design, site planning, and design process. For accelerated status undergraduates only.

Arch 5311. Theory of Architectural Representation. (3 cr; SP-5371, 5372, Arch grad student or #; A-F only)
Integration of emerging computer graphics with photography and architectural graphic conventions. Explores historical, theoretical, and critical issues of representation and the influence of visual media on the architectural field.

Arch 5313. Visual Communication Techniques in Architecture. (3 cr; QP-For undergrads 3311, BA Arch or BED major; for grads M Arch major or #; SP-For undergrads 3301, BA Arch or BED major; for grads M Arch major or #; A-F only)
Exploration of delineation, presentation, and design techniques, using various visual media and methods of investigation.

Arch 5321. Architecture in Watercolor. (3 cr; QP-For undergrads 3311, BA Arch or BED major; for grads M Arch major or #; SP-For undergrads 3301, BA Arch or BED major; for grads M Arch major or #; A-F only)
Watercolor as a tool in the design process. Survey of foundation principles, techniques, medium, tools, and materials. Exploration of color relationships, mixing, composition, and applications to design.

Arch 5351. AutoCAD I. (3 cr; SP-For undergrads 5281, arch major; for grads M Arch major or #; may not be taken for graduate cr)
Basic concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release. Strategies and techniques for producing dimensioned and annotated drawings suitable for plotting and an introduction to 3-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.

Arch 5352. AutoCAD II. (3 cr; SP-For undergrads 5351, arch major; for grads M Arch major or #; may not be taken for graduate cr)
Intermediate concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release. Strategies and techniques for producing dimensioned and annotated drawing suitable for plotting. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.

Arch 5361. Topics in Architectural Representation: 3-D Architectural Modeling and Design. (3 cr; 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 #)
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 #)
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 Aids for Architectural Design. (3 cr; SP-BA Arch or BED major or M Arch or graduate LA major or #; A-F only)
Introduction to electronic media for design, including 2-D drawing, 3-D modeling and animation, printing, and plotting. Introduction to electronic networking and communications, database management, spreadsheet analysis, land-use analysis, and project management.

Arch 5382. Computer Aids for Architectural Design. (3 cr; SP-For undergrads 5381, BA Arch or BED major; for grads M Arch or graduate LA major or #; A-F only)
Understanding computer-aided tools used in design and practice, including 2-D and 3-D CAD and image manipulation. Exploring advanced multimedia visualization techniques for design, including solid modeling, photo-realistic imaging, animation, and video-editing and 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; 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; QP-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; QP-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; 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 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 graduate 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. (1-3 cr; SP-# only; A-F only)
Guided individual reading or study.

Area Studies (Area)

*Institute for Global Studies
College of Liberal Arts*

Area 3144. Introduction to Area Studies. (4 cr)
Approaches to the relationships between local experience and global issues. Gender relations serve as a point of entry into such themes as identity, livelihood, immigration, and family examined through case studies from three regions of the world.

Area 3910. Topics in East Asian Studies. (3 cr)
Description varies with topic title.

Area 3920. Topics in European Studies. (3 cr)
Description varies with topic title.

Area 3930. Topics in Latin American Studies. (3 cr)
Description varies with topic title.

Area 3940. Topics in Middle Eastern Studies. (3 cr)
Description varies with topic title.

Area 3950. Topics in Russian Area Studies. (3 cr)
Description varies with topic title.

Area 3960. Topics in South Asian Studies. (3 cr)
Description varies with topic title.

Area 3993. 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.

Area 3994. Directed Research. (1-4 cr [max 12 cr]; QP-#, Δ, □; SP-#, Δ, □)
Qualified students work on a tutorial basis.

Area 4504. Senior Project. (3 cr; QP-Sr or #: SP-Sr or #)
Research methods, writing skills, and bibliography related to field of study.

Area 5114. International Perspectives—U.S.-Mexico Border Cultures. (3 cr; SP-Grad)
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.

Area 5910. Topics in East Asian Studies. (3 cr)
Description varies with topic title.

Area 5920. Topics in European Studies. (3 cr)
Description varies with topic title.

Area 5930. Topics in Latin American Studies. (3 cr)
Description varies with topic title.

Area 5940. Topics in Middle Eastern Studies. (3 cr)
Description varies with topic title.

Area 5950. Topics in Russian Area Studies. (3 cr)
Description varies with topic title.

Area 5960. Topics in South Asian Studies. (3 cr)
Description varies with topic title.

Area 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.

Area 5994. Directed Research. (1-4 cr [max 12 cr]; QP-#, Δ, □; SP-#, Δ, □)
Qualified students work on a tutorial basis.

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 3101. Intermediate Drawing. (3 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. (3 cr; SP-1001, 1101, 1102)
Painting with an emphasis on development of visual sensibility, individual direction and critical judgment.

Arts 3105. Dimensional Painting. (3 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. (3 cr; SP-1001, 1101)
Field trips to draw or paint in various metropolitan area locations. Site interpretations and experimentation with marks and symbols. Focus on the search for personal content as inspired by the site.

Arts 3111. Life Drawing I. (3 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. (3 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. (3 cr; SP-1001, 1301)
Constructive approach to sculpture through welding in steel and other metals. Studio practice and investigation of historical and contemporary methods and concepts.

Arts 3302. Sculpture: Spatial Problems. (3 cr; SP-1001, 1301)
Focus on sculptural practice outside traditional media and approaches. Theoretical constructions of space as the primary medium of sculpture. Principal topics include installation, theater, public art, and architecture.

Arts 3303. Sculpture: Metalcasting. (3 cr; SP-1001, 1301)
Metal casting of sculpture in bronze, iron, aluminum, and other metals. Studio practice and investigation of historical and contemporary methods and concepts.

Arts 3304. Sculpture: Carving and Construction. (3 cr; SP-1001, 1301)
Carving and construction using wood and other materials. Studio practice and investigation of historical and contemporary methods and concepts. Development of personal sculptural imagery.

Arts 3305. Sculpture: Kinetics. (3 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. (3 cr; SP-1001, 1301)
Studio practice and investigation of forms of expression involving narrative, performance, and installation. Hybrid art forms introduced by the Dada movement in the 1920s, continued by the Fluxus movement in the 1950s, to contemporary performance and installation artists.

Arts 3307. Sculpture: Traditional Approaches. (3 cr; SP-1001, 1301)
Clay modeling of the human figure and other forms. Mold-making and plaster casting with historical and contemporary systems. Studio practice and investigation of traditional sculptural methods and concepts.

Arts 3401. 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. (3 cr; SP-1001, one visual art course)
Study and creation of unique, handmade books using a variety of structures, media, and techniques. Critical, historical, and 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 3411. Honors Tutorial in Visual Arts. (1-3 cr [max 6 cr]; SP-Honors candidate, #, Δ; A-F only)
Individual consultation with a faculty member on visual work, research project, presentation, paper, or bibliography.

Arts 3415. 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 3416. Honors Thesis. (1 cr; SP-Summa Honors candidate, #, Δ; A-F only)
Summa thesis paper written in support of honors exhibition or in relation to the candidate's visual and conceptual interests.

Arts 3444. Major Project. (1 cr; SP-#, Δ; S-N only)
Individually designed independent project or exhibition opportunity.

Arts 3496. Internship in the Arts. (1-4 cr; SP-Art major, #)
Practical field work at a local, regional, national, or international arts organization or with a professional artist provides experience in the activities and administration of art and art based organizations.

Arts 3499. Internship at the Katherine E. Nash Gallery. (3 cr; SP-1001, #)
Provides hands-on experience in the day-to-day operation and mission of the Department of Art's professional gallery.

Arts 3501. Printmaking: Intaglio and Screen. (3 cr; SP-1001, 1501)
In-depth investigation of intaglio and screenprinting. Application of traditional and contemporary techniques emphasizing individual artistic expression. Review of historical and cultural development of the media.

Arts 3502. Printmaking: Relief and Lithography. (3 cr; SP-1001, 1501)
Focus on the expressive and formal aesthetics of woodcut relief and hand lithography. Studio practice and investigation of artistic attitudes as exemplified through historical perspectives, traditional and contemporary usage.

Arts 3505. Papermaking as an Art Form. (3 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. Intermediate Electronic Art. (3 cr; SP-1001, 1601 or #)
Further exploration of digital and electronic media. Emphasis on building computer technologies into agents of individual expression. Discussion of contemporary issues and development of personal direction.

Arts 3701. Photography: Silver Processes. (3 cr; SP-1001, 1701)
Emphasis on classical photographic practice, concentrating on camera and darkroom controls. Historical overview of the medium. Conceptual and contemporary approaches to traditional themes.

Arts 3702. Photography: The Extended Image. (3 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. (3 cr [max 12 cr]; SP-1001, 1701)
Photographic digital imaging in the fine arts context. Manipulation, computer applications, and editing in photo imaging software.

Arts 3801. Ceramics: Wheel Throwing. (3 cr; SP-1001, 1801)
Intermediate course expands wheel-throwing skills and develops aesthetic awareness of ceramic forms. Kiln firing and glaze formulation.

Arts 3802. Ceramics: Handbuilding. (3 cr; SP-1001, 1801)
Intermediate handbuilding ceramic skills and development of abilities and critical awareness. Kiln firing and glaze formulation.

Arts 3803. Ceramics: Mold Making. (3 cr; SP-1001, 1801)
An introductory course in plaster mold making for ceramics. Plaster mold fabrication, ceramic production and contemporary methods and concepts. Development of personal visual expression.

ArtS 3804. Neon. (3 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. (3 cr; SP-3102 or #)

Exploration of abstraction as concept and studio practice with attention to developing individual work. Emphasis on understanding topics relevant to abstraction. Approached from the discipline of painting and open to various material sensibilities.

ArtS 5105. Advanced Dimensional Painting. (3 cr; SP-3105 or #)

Illusory space applied to sculptural forms. Practical applications of spatial and painterly concepts with emphasis on critical and visual judgment. Development of a cohesive body of work reflecting the interaction of both two and three dimensions.

ArtS 5106. Advanced Drawing: Interpreting the Site. (3 cr; SP-3106 or #)

Focus is on the search for personal content as inspired by the site. Field trips (2/3 of course) to draw or paint from various metropolitan area locations. Interpretations will be enhanced by experimentation with new marks and symbols.

ArtS 5110. Advanced Drawing. (3 cr [max 12 cr]; SP-3101 or 3111 or #)

Development of personal direction in terms of form and content. Various media and aesthetic and conceptual approaches.

ArtS 5120. Advanced Painting. (3 cr [max 12 cr]; SP-3102 or #)

Development of personal vision and content through painting. Emphasis on critical thinking, self-evaluation, and the independent pursuit of ideas.

ArtS 5130. Advanced Painting: Watercolor. (3 cr [max 12 cr]; SP-3102 or #)

Expressive and technical possibilities of transparent watercolor. Emphasis on pictorial structure, color relationships, and visual expression. Work from still life, nature, the life model, and imagination.

ArtS 5310. Advanced Sculpture: Direct Metal. (3 cr [max 12 cr]; SP-3301 or #)

Direct metal sculpture in steel and other metals. Studio practice and investigation of historical and contemporary methods and concepts. Development of personal sculpture imagery.

ArtS 5320. Advanced Sculpture: Spatial Problems. (3 cr [max 12 cr]; SP-3302 or #)

Sculptural practice outside traditional media and approaches. Installation, theater, public art, and architecture as topics for individual investigations into spatial organization.

ArtS 5330. Advanced Sculpture: Metal Casting. (3 cr [max 12 cr]; SP-3303 or #)

Metal casting of sculpture in bronze, iron, aluminum, and other metals. Studio practice and investigation of historical and contemporary methods and concepts. Development of personal sculptural imagery.

ArtS 5340. Advanced Sculpture: Carving and Construction. (3 cr [max 12 cr]; SP-3304)

Carving and construction using wood and other materials. Studio practice and investigation of historical and contemporary methods and concepts. Development of personal sculptural imagery.

ArtS 5350. Advanced Sculpture: Kinetics. (3 cr [max 12 cr]; SP-3305 or #)

Studio practice in kinetic sculpture and investigation of historical and contemporary methods and concepts of sculpture produced by motion. Development of personal imagery.

ArtS 5360. Advanced Performance Art and Installation. (3 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. (3 cr [max 12 cr]; SP-3307 or #)

Clay figure modeling. Mold making using historical and contemporary systems; casting in semipermanent materials. Studio practice and investigation of traditional sculptural methods and concepts. Development of personal imagery.

ArtS 5400. Seminar: Concepts and Practices in Art. (3 cr [max 6 cr]; SP-BFA candidate, sr)

Discussion of various ideologies and cultural strategies that influence the practice and interpretation of art. Emphasis on diversity of viewpoints within the practice of contemporary art and culture. Application of these issues in development of the final BFA exhibition.

ArtS 5402. Artists' Books. (3 cr; SP-3402 or #)

Advanced projects in the creation of unique, handmade books using a variety of structures, media, and techniques. Critical, historical, and theoretical issues surrounding contemporary book arts.

ArtS 5403. Women's Images and Images of Women. (3 cr; SP-1001 or #)

For description, see 3403.

ArtS 5490. Workshop in Art. (1-3 cr [max 12 cr])

Selected topics and intensive studio activity. Topics vary yearly.

ArtS 5510. Advanced Printmaking: Intaglio and Screen. (3 cr [max 12 cr]; SP-3501 or #)

In-depth research of intaglio and screen printing with investigation of historical and contemporary applications. Development of imagery using color, photomechanical and digital processes, and cross-media approaches.

ArtS 5520. Advanced Printmaking: Relief and Lithography. (3 cr [max 12 cr]; SP-3502 or #)

Relief printing and lithography for creative expression. Studio practice with stone, metal and wood. Investigation toward developing personal visual language and aesthetics. Historical and contemporary awareness, evolving technologies and strategies.

ArtS 5550. Advanced Papermaking. (3 cr [max 12 cr]; SP-3505 or #)

Focus on distinct expressive qualities of handmade paper and its versatility as a contemporary art form. Independent research interests are pursued in consultation with instructor.

ArtS 5610. Advanced Electronic Art. (3 cr [max 12 cr]; SP-3601 or #)

Synthesis of artistic form and content using digital technologies. Independent projects pursued in consultation with instructor.

ArtS 5710. Advanced Photography. (3 cr [max 12 cr]; SP-Two sem of 3xxx photography or #)

Design and implementation of individual advanced projects. Demonstrations, lectures, and critique. Reading, writing, and discussion of related articles and exhibitions.

ArtS 5810. Advanced Ceramics. (3 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. (3 cr; SP-3801 or 3802 or #)

Ceramic materials and their interrelationships. Advanced investigation of glazes, slip formulation, and clay bodies in both high and low temperature ranges. Individual interests related to students' aesthetic needs.

ArtS 5830. Advanced Ceramics: Mold Making. (3 cr [max 12 cr]; SP-3803 or #)

Advanced mold making for ceramics. Plaster mold fabrication, ceramic production and contemporary methods and concepts. Development of personal visual expression.

ArtS 5840. Advanced Neon. (3 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 (ArthH)

Department of Art History**College of Liberal Arts****ArthH 1001. Introduction to Art History.** (4 cr)

Global examples will be used to consider issues such as the creative process, how art shapes human thought, art as commodity, art and religion, representation of the human body, and the constructed space in which humans function known as architecture.

ArthH 1016. 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.

ArthH 1026. Honors: Introduction to Asian Art. (4 cr; QP-Permission of CLA honors adviser; SP-Permission of CLA honors adviser)

For description, see 1016.

ArthH 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.

ArthH 1921. Introduction to Film Study. (4 cr)

Fundamentals of film language and major theories of cinema presented through detailed analysis of several films including John Ford's *Stagecoach* and Jean-Luc Godard's *Breathless*.

ArthH 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.

ArthH 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.

ArthH 3009. History of Medieval Art. (4 cr)

Emphasis on principal monuments, their decoration and function (e.g. Old St. Peter's, Rome; Hagia Sophia, Istanbul; Palace Chapel, Aachen; St. Sernin, Toulouse; Cathedral of Chartres, Paris, Rheims).

ArthH 3011. 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).

ArthH 3012. History of 19th- and 20th-Century Art. (4 cr)

Major monuments and issues of modern period: sculpture, architecture, painting, and prints. Movements include neoclassicism, romanticism, realism, impressionism, evolution of modernism, symbolism, fauvism, cubism, dadaism, surrealism, abstract expressionism, pop art, conceptualism, and post-modernism.

ArthH 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.

ArthH 3014. Art of India. (4 cr)

Indian sculpture, architecture, and painting from the prehistoric Indus Valley civilization to the present day.

Arth 3015. 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 subcontinent. 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 3303. 17th- and 18th-Century Painting in France. (4 cr)

Survey of French painting from Baroque through the 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 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. Auto-biographical 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. (4 cr)

American popular culture in the 19th and 20th centuries; fashion, greeting cards, holiday celebration, public spectacle, magazine covers, and commercial design.

Arth 3921. 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 3930. Honors: Junior-Senior Seminar. (3 cr; SP-Honors jr or sr Arth major; A-F only)

Focus on a major art historical theme, artist, period, or genre. Exclusively for honors majors in art history.

Arth 3971. Major Project. (1 cr; SP-Arth major, #; A-F only)

Completion of a research paper begun in a 5xxx "project 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 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 student, 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, one 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 student 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; 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 student 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 5324. 15th-Century Painting in Northern Europe. (3 cr; SP-jr or sr or grad student 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 student 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-\$3303; 3011 or grad student or #)

17th-century painting in Holland and Belgium (e.g., Rembrandt, Rubens); 17th- and 18th-century architecture, sculpture, and painting in France (e.g., Versailles, Poussin, Watteau).

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 5521. Modernism and Modernity in American Painting: 1876 to 1945. (3 cr)

Relationship between modernity and "modernism" in the visual arts between the Centennial Exposition of 1876 and World War II. Artists addressed include the Ash Can School and the Regionalists.

Arth 5535. Style, Tradition, and Social Content in American Painting: Colonial Era to 1876. (3 cr)

America's colonial, Revolutionary era, and 19th-century painters' responses to the influence of European aesthetics. Key American painting types: portraiture, rural genre, and landscape from Copley and Gilbert Stuart to the Hudson River School and the chroniclers of the Western frontier.

Arth 5536. Topical Studies in American Art. (3 cr)

Course description varies from year to year, depending on the current research interests of the instructor and the needs and interests of advanced undergraduate and graduate students in modern and American art.

Arth 5546. American Architecture: 1840 to 1914. (3 cr)

American architecture from 1840 to 1914, examined in relation to European precedents and American sociohistorical conditions. Critical attention to problems of style, the architectural profession, vernacular vs. 'high' architecture, technology, economics, urbanism, and social reform.

Arth 5725. Ceramics in the Far East. (3 cr)

Selective examination of representative pottery and ceramic wares produced in China, Korea, and Japan from the Neolithic era to modern times. Nearly every major ceramic type is represented.

Arth 5765. Early Chinese Art. (3 cr)

The goal of the course is to 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. Attention will be given to major archaeological sites and to 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 freestanding 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—One 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 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: East Asian Gardens. (3 cr)

An examination of the cultural significance of the garden in China, Japan, and Korea. Special attention given to the religious, political, and secular influences from the Han Dynasty to modern times.

Arth 5960. Topics: Islamic Art. (3 cr [max 6 cr])

Important topics in the history of Islamic art and architecture; topics vary year to year.

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 1011. 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 student or #; SP—Upper div CLA or upper div IT or grad student or #)

Introduction to using computer programs to solve problems in physical sciences. Selected numerical methods, mapping problems onto computational algorithms. Arranged lab.

Ast 4299. Senior Honors Astrophysics Research Seminar. (2 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 4994. 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 student 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, Molecular Biology, and Biophysics

College of Biological Sciences and the Medical School

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 sciences programs such as dental hygiene or occupational therapy.

BioC 1012. General Principles of Biochemistry. (3 cr; QP—Chem 1001 or 1 qtr college chem; SP—Chem 1011)

Continuation of Chem 1011. Elementary survey of biochemistry beginning with a review of organic chemistry.

BioC 3001. Biochemistry for Health Sciences. (3 cr; QP—College chem or #; SP—College chem or #)

Survey of organic chemistry and biochemistry outlining structure and metabolism of biomolecules, basic principles of molecular biology, and regulation of physiological processes. Suitable for undergraduate science majors, pre-med or pre-nursing students, or other health sciences students.

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—Interest in a biochemistry major, #; SP—Interest in a biochemistry major, #; S-N only) Lectures and discussion on current research in the department.

BioC 4001. Biochemistry. (3 cr; QP—General chem, organic chem or #; SP—General chem, organic chem or #)

Chemical properties, biosynthesis, catabolism, structure and function of biomolecules. Fundamental aspects of molecular biology and metabolic regulation. Required for first-year medical technology majors. Appropriate for advanced undergraduates and graduate students.

BioC 4002. Biochemistry of Physiological Processes.

(2 cr; QP—MdBc 5300 or #; SP—MdBc 5300 or #) Physiological biochemistry emphasizing processes occurring in humans. Required for medical technology majors.

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, Metabolism and Bioenergetics of Biological Systems.

(4 cr; QP—Biol 1009 or Biol 1202, 2 qtrs organic chemistry or #; SP—Biol 1002 or 1009, Chem 2302) Advanced survey of structure and catalysis, metabolism and bioenergetics.

BioC 4332. Biochemistry II: Molecular Mechanisms of Gene Action and Biological Regulation. (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 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–\$MicE 5309; chemistry through organic chemistry; knowledge of word processing, e-mail, access to World Wide Web, access to college-level science library recommended; SP–\$MicE 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 5531. Macromolecular Crystallography I: Fundamentals and Techniques. (1 cr; QP–One qtr organic chem, biochem or #, two qtrs calculus, college physics; SP–One qtr/sem organic chem, biochem or #, two qtrs/sems calculus, college physics; S-N only) Macromolecular crystallography as required for protein structure determination and engineering and techniques used to determine the structure of a macromolecule from its diffraction.

BioC 5532. Macromolecular Crystallography II: Techniques and Applications. (1 cr; QP–MdBc 5531; SP–MdBc 5531; S-N only) Techniques used to determine the structure of a macromolecule from its diffraction. Practical use of current software in macromolecular crystallography.

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.

BioC 5401. Advanced Metabolism and Its Regulation. (3 cr; QP–3021 or 5331; SP–3021 or 4331 or Biol 3021) Underlying principles that determine the metabolism of both common and unusual compounds in plants, animals, and microorganisms. Regulation of carbon and energy flow in whole organisms.

BioC 5444. Muscle Biochemistry. (3 cr; QP–3021 or 5331 or Phsl 3052 or #; SP–Biol/BioC 3021 or BioC 4331 or Phsl 3061 or #) Fundamentals of muscle biochemistry and physiology. Muscle membranes: the structures, mechanisms, and physiological roles of channels and pumps. Muscle contraction: force generation by actin and myosin.

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–\$MdBc/Chem 5530; BioC/MdBc/Chem 5525 or 5526 or 5527 or 5528 or equiv; SP–\$MdBc 5530; BioC/MdBc 5527 or 5528 or equiv) Discussion of topics from current literature on the biophysics of proteins, nucleic acids, muscle, and membranes. Content and instructors vary from one offering to another, on an approximately every other year rotation.

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 1002. 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 and transport, energy processing in cells, introduction to primary metabolism, molecular genetics, cell physiology, cell cycles, principles of animal and plant development, regulation of development. Lab focuses on molecular scientific techniques and 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–\$ES 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–1951 or 1952 or 1953; SP–1020 or ¶1020; S-N only) Individual study or research undertaken by a student concurrently enrolled in Biol 1020 with oversight by a faculty sponsor.

Biol 1101. Heredity and Human Society. (3 cr; QP–\$5003, \$GCB 3022; SP–\$4003, \$GCB 3022) Principles of heredity and their social and cultural implications.

Biol 1111. Freshman Seminar for the Biological Sciences. (2 cr; A-F only) Orientation to the university environment, special topics in the biological sciences that illustrate the importance of biological topics and issues in modern society. Topics vary according to instructor.

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–\$1106; 3111; SP–\$2012; 3211 or ¶3211, Phsl 3051 or ¶Phsl 3051) 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–1009 or 1001; A-F only) Principles of plant biology; organization, function, growth and development, and reproductive biology of plants and plant-like organisms. Includes lab.

Biol 2032. General Microbiology With Laboratory. (4 cr; QP–1203 or 1009, Chem 1052; intended primarily for non-microbiology majors; SP–\$3301, \$MicB 2032, \$MicB 3301, \$VPB 2032; 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, declared biological sciences major, Δ; SP–1009 or 1002 or equiv, declared biological sciences major, Δ; S-N only) Hands-on use of microcomputers to show how computers can manipulate data, prepare graphs and graphics, acquire and analyze scientific data, perform literature searches, prepare scientific presentations, and communicate with others via the network.

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 3005. Plant Function Laboratory. (2 cr; QP–1009 or 1202, one qtr chemistry with some organic content [e.g., Chem 1001]; SP–¶3002) A lab/recitation course to accompany Biol 3002. Lab work will investigate a variety of plant processes at subcellular, organ, and whole plant levels.

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- $\text{\$BioC 3021; 1002 or 1009, Chem 2301}$)

Fundamentals of biochemistry including structure and function of proteins, nucleic acids, lipids and carbohydrates, metabolism, and regulation of chemical equilibrium, 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- $\text{\$Nsc 3101, \$Phsl 3101; 5004, BioC 3021 or BioC 5331; SP- $\text{\$Nsc 3101, \$Phsl 3101; Biol/BioC 3021 or BioC 4331}$ }$)

Basic principles of cellular and molecular neurobiology and nervous systems.

Biol 3102. Introduction to Neuroscience II: Biological Basis of Behavior. (3 cr; QP- $\text{\$Nsc 3102, \$Phsl 3102; 3101, or Nsc 3101 or Phsl 3101; SP- $\text{\$Nsc 3102, \$Phsl 3102; 3101, or Nsc 3101 or Phsl 3101; A-F only}$ }$)

Organization of neural systems and subsystems underlying the sensory and motor aspects of behavior.

Biol 3105. Neurobiology Laboratory I. (1.5 cr; QP- $\text{\$Nsc 3105, \$Phsl 3105; Nsc 3101 or Phsl 3101 or \text{\$} SP- $\text{\$Nsc 3105, \$Phsl 3105; 3101 or Nsc 3101 or Phsl 3101 or \text{\$} A-F only}$ }$)

Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

Biol 3115. Neurobiology Laboratory II. (1.5 cr; QP- $\text{\$Nsc 3115, \$Phsl 3115; Nsc 3102 or Phsl 3102 or \text{\$} SP- $\text{\$Nsc 3115, \$Phsl 3115; 3102 or Nsc 3102 or Phsl 3102 or \text{\$} A-F only}$ }$)

Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

Biol 3211. Animal Physiology. (3 cr; QP-1009 or 1201, Chem 1051; SP- $\text{\$Phsl 3051; 1001 or 1009, Chem 1021, \text{\$} Biol 2005 strongly recommended}$)

Comparative physiology of various animal groups. Compare ways different animals solve similar physiological problems.

Biol 3301. Biology of Microorganisms. (5 cr; QP- $\text{\$5013, MicB 3103, VPB 3103; 5001 or Biol/BioC 3021 or BioC 5331 or \text{\$} SP- $\text{\$2032, \text{\$} MicB 2032, \text{\$} MicB 3301, \text{\$} VPB 2032; 1002 or 1009, Chem 2302; A-F only}$ }$)

Taxonomy, anatomy, physiology, biochemistry, pathogenesis, immunology, ecology of microbes. Molecular structure in relation to bacterial function and disease. Includes lab.

Biol 3407. Ecology. (3 cr; QP-1009 or 1201 or equiv, Math 1251 or 1142 or equiv; SP-1001 or 1009 or equiv, Math 1271 or 1142 or equiv)

Scientific exploration of principles of population growth, population interactions, and of ecosystem function applied to ecological issues of scientific and societal importance, including the regulation of human populations; dynamics, and impacts of disease; invasions by exotic organisms; habitat fragmentation, biodiversity.

Biol 3409. Evolution. (3 cr; QP-1009 or 1203; SP-1002 or 1009)

Study historical evolution through divergence of biological forms in fossil record and in presently existing biological diversity. Genetic mechanisms of evolution elucidated by examples of ongoing evolution in wild and domesticated populations, and in disease-causing organisms.

Biol 3411. Introduction to Animal Behavior. (3 cr; QP-1009 or 1202 or #; SP-1002 or 1009 or #)

Survey of the biological study of animal behavior, including mechanism development, function, and evolution. Emphasis on evolution of adaptive behavior and social behavior in the natural environment.

Biol 3413. Biological Rhythms and Timing Mechanisms. (3 cr; QP-1009 or 1201; SP-1001 or 1009)

Timing mechanisms and rhythms of organisms in physiological processes, ecological adaptation, and health; current hypotheses concerning their cellular and molecular nature. Individual projects.

Biol 3600. Directed Instruction. (1-2 cr [max 6 cr]; QP-1951, 1952 or 1953; SP-1020, application required, #; up to 4 cr may apply to major; S-N only)

Leadership opportunities for upper division students wishing to assist with the Biology Colloquium.

Biol 3700. Undergraduate Seminar. (1 cr [max 3 cr]; S-N only)

Faculty members lead groups of students in discussions on topics of current interest.

Biol 3960. Honors Seminar. (1-2 cr [max 2 cr]; QP-Limited to participation in CBS honors program, Δ ; SP-Limited to participation in CBS honors program, Δ ; S-N only)

Oral reports on topics of current interest to biologists. Progress reports on laboratory and field research by students.

Biol 4003. Genetics. (3 cr; QP- $\text{\$BioC 3021 or 5331; SP- $\text{\$Biol/BioC 3021 or BioC 4331}$ }$)

Introduction to the nature of genetic information, its transmission from parents to offspring, its expression in cells and organisms, and its course in populations.

Biol 4004. Cell Biology. (3 cr; QP-5003 or BioC 5333, BioC 3021 or BioC 5331; SP- $\text{\$Biol/BioC 3021 or BioC 5331, Biol 4003 or BioC 4332}$)

Processes fundamental to cells emphasizing eukaryotic cells. Assembly and function of membranes and organelles. Cell division, cell form and movement, intercellular communication, transport, and secretion pathways. Some discussion of specialized cells including cancer cells and differentiated cells.

Biol 4125. Recombinant DNA Laboratory. (3 cr; QP- $\text{\$5825, \text{\$} MicB 5425; BioC 3021 or Biol 5003; SP- $\text{\$4825; Biol/BioC 3021 or Biol 4003, BioC 4025, GCB 4015, GCB 4025 or MicB 3301; A-F only}$ }$)

Basic recombinant DNA techniques: methods for growing, isolating, and purifying recombinant DNAs and cloning vectors, DNA sequencing and sequence analysis, gene expression, Polymerase Chain Reaction (PCR), Southern and Western blotting, and other current techniques.

Biol 4501. Social Uses of Biology. (3 cr; QP-10 cr in sciences; SP-7 cr in sciences)

Influence of biological science on the quality of human life: agriculture, medicine, occupational health, environmental science, and theories of human nature. Responsibilities and roles of biologists in policy formulation in the scientific and political world.

Biol 4825. Recombinant DNA Laboratory. (3 cr; QP-Biochemistry or genetics course, intermediate-level lab in biochemistry or genetics or cell biology or microbiology, enrollment in Summer Undergraduate Research Program in Life Sciences; SP- $\text{\$4125; biochemistry or genetics course, intermediate-level lab in biochemistry or genetics or cell biology or microbiology, enrollment in Summer Undergraduate Research Program in Life Sciences; A-F only}$)

Basic recombinant DNA techniques. Methods for growing, isolating, and purifying recombinant DNAs and cloning vectors.

Biol 4850. Special Topics in Biology. (1-7 cr [max 7 cr]; QP- Δ ; SP- Δ)

Biol 4950. Special Topics in Biology. (1-5 cr [max 10 cr]) In-depth study of a specialized topic in the life sciences

Biol 5407. Ecology. (3 cr; QP- $\text{\$3407; 1009 or 1201 or equiv, Math 1251 or Math 1142 or equiv, grad student or \text{\#}; SP- $\text{\$3407; 1001 or 1009 or equiv, Math 1142 or Math 1271 or equiv, grad student or \text{\#}}$ }$)

Scientific exploration of principles of population growth, population interactions, and of ecosystem function applied to ecological issues of scientific and societal importance including the regulation of human populations; dynamics and impacts of disease; invasions by exotic organisms; habitat fragmentation, biodiversity.

Biol 5409. Evolution. (3 cr; QP- $\text{\$3409; 1009 or 1202, grad student or \text{\#}; SP- $\text{\$3409; 1001 or 1009, grad student or \text{\#}}$ }$)

Historical evolution through consideration of divergence of biological forms in fossil record and in presently existing biological diversity. Genetic mechanisms of evolution elucidated by examples of ongoing evolution in wild and domesticated populations and in disease-causing organisms.

Biol 5501. Biological Collections: Curation and Management. (1 cr; QP-1103 or 1106 or 3011 or 3012; SP-2012 or 2022 or 3007 or 3211)

Roles and value of biological collections in terms of biodiversity; natural history museum management and philosophy; conservation of museum specimens; data access and ethics. Students participate in various curatorial activities.

Biol 5511. Teaching the Biological Sciences. (3 cr; QP-9 cr in the life sciences; SP-6 cr in the life sciences; A-F only)

Methods and teaching styles used by outstanding university teachers including reviews and critiques from research on teaching. Opportunities for students to practice and evaluate teaching strategies.

Biol 5910. Special Topics in Biology for Teachers.

(1-4 cr [max 12 cr]; QP-BA or BS in science or science education or elementary education or K-12 licensed teacher; SP-BA or BS in science or science education or elementary education or K-12 licensed teacher) Courses developed for K-12 teachers depending on topics or subtopics which might include any of the following: plant biology, animal biology, genetics, cell biology, biochemistry, microbiology.

Biomedical Engineering (BME)

Graduate School

BME 5001. An Introduction to Biomaterials. (3 cr; SP-First-yr grad BME major; general chem, organic chem, biochem, polymer sci recommended; A-F only) Commonly used biomaterials. Chemical and physical aspects; practical examples from such areas as cardiovascular and orthopedic applications, drug delivery, cell encapsulation. Methods used for chemical analysis and physical characterization of biomaterials. Effect of additives, stabilizers, processing conditions, sterilization methods.

BME 5041. Tissue Engineering. (3 cr; SP-IT upper div or grad student or med student or #; A-F only) 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 5201. Musculoskeletal Biomechanics. (3-4 cr; SP-IT upper div or grad student, AEM [statics, deformable media] or #; A-F only)

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 orthopaedic devices, and implants.

BMEn 5301. Biology in Bioengineering. (3-4 cr; SP–Engineering upper div or grad student)
Introduces biomedical engineers to concepts of cell and tissue structure and function. Basic principles of cell biology and their utilization in engineering applications such as tissue engineering and artificial organs.

BMEn 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.

BMEn 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.

BMEn 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.

BMEn 5910. Special Topics in Biomedical Engineering. (2-4 cr)

BMEn 5920. Special Topics in Biomedical Engineering. (2-4 cr)

Biosystems and Agricultural Engineering (BAE)

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–3031, AEM 3200 or CE 3400, Biol 1009, IT student; SP–Biol 1009, CE 3502 or ¶CE 3502)
Physical, thermal, texture, strength, and moisture properties of soil. Saturated and unsaturated moisture movement. Energy and water balances in soil-plant systems. Plant stresses from drought, flooding, temperature, radiation, compaction, pollution. Engineering and 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 4112. 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 4122. 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 student 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–3052, upper div IT or grad student; 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 bioproduct technology; topics in bioremediation; modeling of separation processes in biological systems.

BAE 4723. Food Process Engineering. (3 cr; QP–ChEn 5103 or ME 5342, upper div IT or grad student in IT major; 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–3052 or CE 3300, CE 3400, upper div IT or grad student; 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. (2 cr; S-N only)

Self-paced course to assess students' computing skills and identify resources to help them develop necessary skills in word processing, spreadsheets, presentation software, e-mail, LUMINA, remote access, and the World Wide Web.

BA 3033. Business Communication. (4 cr; QP–Freshman composition, CSOM student; SP–Freshman composition, CSOM student; A-F only)
Uses cases, simulations, and other "real-world" situations to give students opportunity to practice and refine the written and oral communications skills needed for effective participation in contemporary organizations. Current communication technology used in course delivery and assignments. Topics range from basic principles to communication strategy.

BA 3998. Independent Study. (1-4 cr)
Student-initiated project and/or independent course of study.

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; SP-\$AgEE 3112; 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; SP-\$AgEE 3121; 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 on-line 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. Data Base Microcomputer Applications. (3 cr; SP-5011 or equiv)

Examination of business needs requiring computerized data bases. Use 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)

A 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)

Examination of 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 the 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)

Examination of the 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 software; 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 cr.

BIE 5597. Internship: Business and Industry Education. (1-8 cr [max 12 cr]; 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; SP-\$HRD 5601; 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.

BIE 5624. Sales Training. (3 cr; SP-\$HRD 5624; 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; SP-\$HRD 5625)

Analyze technical skills and training practices in business and industry; systems and process analysis; troubleshooting of work behavior; design methods and developing training materials.

BIE 5626. Customer Service Training. (3 cr; SP-\$HRD 5626; 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; SP-\$HRD 5627)

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-\$HRD 5628; 5011 or equiv)

Designing, creating, and presenting information using multimedia resources in business settings.

BIE 5629. Course Development for Business and Industry. (2 cr; SP-\$HRD 5629; 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; SP-\$HRD 5661)

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-\$HRD 5662; 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 3040. The Environment of the International Firm. (4 cr; QP-Mgmt 3001; SP-Mgmt 3001; A-F only)

The challenges, opportunities, and problems businesses face when operating outside their domestic environment; competitive forces that have consequences for their performance and survival; broad introduction to international economics, finance, and trade issues that affect multinational business decisions and 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 cr; SP-40 or more cr; 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; QP-Kin major or adviser approval; SP-Kin major or adviser approval; A-F only)

Introduction to human anatomy with emphasis on musculoskeletal anatomy germane to athletic training, biomechanics, exercise physiology, motor learning, and motor development.

CBN 3001. Human Anatomy. (3-4 cr; SP-Biol 1009 or equiv, soph)

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 Chaghatai Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

CAS 3601. Fiction of Iran and Central Asia in Translation. (3 cr; 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 Chaghatai Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

CAS 5601. Fiction of Iran and Central Asia in Translation. (3 cr; 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 4001. Material and Energy Balances. (4 cr; QP-Chem 3302, Math 3261, Phys 1253, 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-5001, 5101, upper div ChEn major; SP-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-5102, upper div ChEn major; SP-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-5103, 5201; SP-4003, 4101; A-F only)

Introduction to unit operations and mass transfer operations used in separation processes.

ChEn 4101. Chemical Engineering Thermodynamics. (4 cr; QP-5101, Chem 5534; SP-4001 or ¶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-5201, 5202; SP-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 4401. Chemical Engineering Lab I. (3 cr; QP-5151, 5102, 5201; SP-4003, 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 4402. Chemical Engineering Lab II. (3 cr; QP-5401; SP-4003, 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 4501. Chemical Engineering Process Design. (3 cr; QP-5104, 5401, 5301; SP-4003)
Engineering economics of process evaluation, including time and bases for cost estimation. Engineering design through group projects. Case studies.

ChEn 4502. Chemical Engineering Process Design II. (3 cr; QP-5501; SP-4004, 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-5301, 5104; SP-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-5601; SP-4601 or ¶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-5103, 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-5103, 5202; SP-4003, 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-5301; SP-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. (2 cr; QP-5103 or #; SP-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 sr or #; SP-¶ME 5381, ¶BMEn 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-5103; SP-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-5103 or #; SP-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, 2 yrs high school math; high school physics recommended; SP-For students not passing placement exam; high school chemistry or equiv, 2 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 1032. Honors Chemistry II. (4 cr; QP-IT honors or consent of IT Honors Office, 1051H or equiv or pass Honors placement exam; SP-IT honors or consent of IT Honors Office, 1021 or equiv or pass Honors placement exam; A-F only)
Advanced introductory course including chemical kinetics and reaction mechanisms; principles of chemical and physical equilibria; acids and bases; entropy and second law of thermodynamics; electrochemistry and corrosion; descriptive chemistry of the elements; coordination chemistry; biochemistry; applications of chemical principles to environmental problems. Lab emphasizes writing appropriate to 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. (2 cr; QP-3301; Chem, ChemE, BioC majors only; SP-¶2313, 2301 or ¶2301; Chem, ChemE, BioC majors only; A-F only)
Honors organic chemistry lab replacing 2311 and 4311.

Chem 2313. Honors Organic Lab. (3 cr; QP-3301; Chem, ChemE, BioC majors only; SP-¶2312, 2301 or ¶2301; Chem, ChemE, BioC majors only)
Honors organic chemistry lab replacing 2311 and 4311.

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-1 yr college chemistry, 1 yr college physics, 1 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-1 yr college chemistry, 1 yr college physics, 1 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 4094. Directed Research. (1-3 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-5100, 5131, 5501 or 5534; SP-2101, 2111, 3501; A-F only)
Basic electronic, optical, and 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 4111. 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 4311. Advanced Organic Chemistry Lab. (2 cr; QP-3302, 3306; SP-2311)
Reactions, techniques, and instrumental methods in synthetic organic chemistry.

Chem 4511. 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 4711. Advanced Inorganic Chemistry Lab. (2 cr; QP-5702, chem major; SP-4701 or ¶4701, chem major; A-F only)
Lab experiments in inorganic and organometallic chemistry illustrating synthetic and 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 student 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.

Chem 5201. Solid State Chemistry. (4 cr; QP-3301, 5501 or 5534 or #; SP-3501 or equiv or #)
Advanced introduction to materials chemistry. basic structure of crystalline solids and fundamentals of crystallography and X-ray diffraction. Close packing applied to metals, covalent/ionic solids, and molecular crystals. Methods of synthesis of solid state compounds. Characterization techniques. Selected physical properties of materials.

Chem 5221. Introduction to Polymer Chemistry. (4 cr; QP-3302, 5502 or #; SP-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 5223. Polymer Laboratory. (2 cr; QP-5610 or #; SP-5221 or 8211 or #)
Synthesis, characterization, and physical properties of polymers. Free radical, condensation, emulsion, and anionic polymerization; infrared spectroscopy and gel permeation chromatography; viscoelasticity, rubber elasticity, and crystallization.

Chem 5311. Chemistry of Industry. (4 cr; QP-Chem sr or grad student 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 by year and include 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 student or #; SP-4701 or equiv, chem grad student 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.

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 1106. Introduction to Chicana/o Studies: Mexico and the United States From 1871 to Present. (4 cr)
Convergence of Spanish-Mexican and Anglo-American societies in the Spanish borderlands; the formation of contemporary Chicano political, economic, and cultural consciousness, and the 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 student)
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)
Examines the 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. (3 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-Chic sr, #)
Analysis and contextualization of Ancient and Colonial Mexican Literature such as Popol Vuh, Rabinal Achi, Chilam Balam, Codex Mendoza, Juan Ruiz de Alarcon, and Sor Juana Ines de la Cruz.

Chic 5901. Chicana(o) Studies: Theory and Methodology. (3 cr)
Focus on theory and methodology of Chicano Studies scholarship in social sciences and humanity.

Chic 5920. Topics in Chicana(o) Studies. (3 cr; SP-Grad student or sr, #)
Multidisciplinary themes in Chicano Studies. Examination and analysis of issues of current interest.

Chic 5921. Chicano Studies Topics: Women and the Law. (3 cr)
Surveys the status of women in the law. Examines a wide realm of legal issues impacting women, with primary focus on Chicanas and Native American women. Examines 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 psychology; SP-4 cr intro psychology)
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-1301 or #; SP-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. (2-4 cr [max 12 cr]; QP-1301; SP-Psy 1001)
Selected topics in child development are examined in depth; topics and cr vary.

CPsy 4311. Behavioral and Emotional Problems of Children. (4 cr; QP-1301 or equiv.; SP-Intro psychology; 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. Developmental Disabilities. (4 cr; QP-1301 or equiv.; SP-Psy 1001)
Surveys all areas of exceptionality: mental, hearing, vision, physical and speech and language handicaps; learning disabilities; autism; emotional and behavior disorders; and 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-1301, Psy 1001; SP-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 4334. 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-1301, 3331/5331; SP-2301 or equiv, 4331; A-F only)
Processes and functions of interactions with parents and peers; analysis of theory and research on developmental changes and influences.

CPsy 4341. Perceptual Development. (4 cr; QP-1301; SP-2301)
Perceptual learning and the development of sensory and 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-1301; SP-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 psychology; SP-#; 4 cr child psychology; S-N only)
Students serve as teaching assistants in courses with the instructor's permission. Peer advising opportunities are also available for one cr 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 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 cr while interning in the 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 2021. Intermediate Modern Chinese. (5 cr; SP-1012 or 1015 or equiv or #)
Modern standard Chinese skills developed further through conversations, writing, and reading.

Chn 2022. Intermediate Modern Chinese. (5 cr; SP-2021)
Modern standard Chinese skills developed further through conversation and reading.

Chn 3031. Advanced Modern Chinese. (4 cr; SP-2022 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 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-Knowledge of Chinese not 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-Knowledge of Chinese not 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 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-3300, upper div IT or grad student; 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-AEM 3016, IT or grad student; 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-AEM 3016, upper div IT; SP-AEM 3031, upper div IT; 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-Math 3261, AEM 1015 or AEM 3016, IT or WPS major; SP-Math 2243, AEM 2012 or AEM 2301, IT or ForP major; 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 4101. 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 4102. 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 student; 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-3020, Math 3251, Math 3252, CE or upper div GeoE; SP-3101, Math 2243, Math 2263, CE or upper div GeoE; 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-#; 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-#; 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 student, 3200 or #; SP-CE or upper div GeoE or grad student, 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-3300, 5603, IT or grad student; SP-3201, 3301, 3402, upper div IT 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-5603, upper div IT or grad student; SP-3402, upper div IT or grad student 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-3300, upper div IT or grad student; SP-3301, GeoE 3301, upper div IT 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–GeoE 5302, IT or grad student in IT major or #; SP–3311, GeoE 3311, upper div IT or grad student in IT major 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–Stat 3091, CE or GeoE or Geo sr or grad student or #; SP–Stat 3021, CE, GeoE or upper div Geo or grad student 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–3400, IT or grad student or #; SP–3502, upper div IT or grad student 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–5425, IT or grad student or #; SP–4351, GeoE 4351, upper div IT or grad student 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–5600, 5603, upper div IT or grad student; SP–Upper div IT or grad student, 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–5600, upper div IT or grad student; SP–3401, upper div IT or grad student 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.

CE 4412. Reinforced Concrete Design II. (3 cr; QP–5611, IT or grad student; SP–Upper div IT or grad student, 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–5610, IT or grad student; SP–Upper div IT or grad student, 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–3400, IT or grad student 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–3400, Chem 1052, IT or grad student 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. (3 cr; QP–5401, IT or grad student 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–3400, 5401, IT or grad student or #; SP–3502, IT or grad student 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–3501, upper div; 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–Chem 1052, IT or grad student or #; SP–Chem 1022, 3501, IT or grad student 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. Remediation Technology. (3 cr; QP–5401, 5501, IT or grad student 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–3200, IT or grad student; 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–3200, IT or grad student, #; 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–5603, upper div IT or grad student; SP–4231, upper div IT or grad student 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–4232, upper div IT or grad student 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–3402, upper div IT or grad student 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–5603, upper div IT or grad student; SP–4301, GeoE 4301, upper div IT or grad student 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 student; SP–4301 or GeoE 4301, upper div IT or grad student; 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–3300, upper div IT or grad student; SP–4301, upper div IT or grad student 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–5600, AEM 3036, upper div IT or grad student; SP–Upper div IT or grad student, 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 student, 5611, 5612; 5613 recommended; SP–Upper div IT or grad student, 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–5600, IT or grad student or #; SP–Upper div IT or grad student, 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 student or #; SP–Upper div IT or grad student 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 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 two day-long sessions for nine to ten 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: Athens and Democracy. (3 cr)
The emergence of democracy in the shadows of two brutal wars; one foreign, one civil. Reflections on democracy, war, and empire through the lens of tragedy, comedy, and 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 Sins of the Emperors. (3 cr)
The Roman Empire; "silver age" of Latin literature and rise of Christianity; art and architecture.

Clas 1023. Late Antiquity: The Christian Revolution. (3 cr)
Change and continuity in Roman Empire from its 2nd-century zenith through 3rd-century crisis to the first Christian emperor (A.D. 306 to 337) and beyond. Replacement of classical paganism by Christianity. Beginnings of monasticism. Superpower relations between Roman and Persian Empires. Meets with 3023.

Clas 1024. Late Antiquity: Pagans, Bishops, and Barbarians. (3 cr; SP-\$3024)
Cultural diversity (A.D. 363 to circa A.D. 500). Replacement of the Roman Empire in Western Europe by barbarian kingdoms, consolidation of Constantinople as capital in the East. Literature, art, and 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 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 1142. 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 1182. Honors Course: Jesus in History. (4 cr; SP-Undergrad honors status)
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 Clas 1082.

Clas 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.

Clas 3001. 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. Late Antiquity: The Christian Revolution. (3 cr; SP-\$1023)
Change and continuity in Roman Empire from its 2nd-century zenith through 3rd-century crisis to the first Christian emperor (306 to 337 A.D.) and beyond. Replacement of classical paganism by Christianity. Beginnings of monasticism. Superpower relations between Roman and Persian Empires. Meets with 1023.

Clas 3024. Late Antiquity: Pagans, Bishops, and Barbarians. (3 cr; SP-\$1024)
Cultural diversity (A.D. 363 to circa 500 A.D.). Replacement of the Roman Empire in Western Europe by barbarian kingdoms, consolidation of Constantinople as capital in the East. Literature, art, and 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 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 3081. Classical Epic in Translation. (3 cr; SP-\$15081)
Homer's Iliad and Odyssey; Virgil's Aeneid; cultural context of epic; development of the hero; epic style; poetics of epic.

Clas 3082. Greek Tragedy in Translation. (3 cr)
Origins of tragedy; ancient theatres; selected plays of Aeschylus, Sophocles and Euripides.

Clas 3083. Ancient Comedy. (3 cr)
Greek and Roman comic drama; Aristophanes, Menander, Plautus, Terence, etc.

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 approaches to 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 3171. Honors Course: Greek and Hellenistic Religions. (4 cr)

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 3071. Honors students also meet weekly for recitation.

Clas 3172. Honors Course: The New Testament. (4 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; biblical writings as history and narrative. Meets with 3072. Honors students meet weekly for recitation section.

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-CICv 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-2 literature courses or #)

Selected topics in classical literature (e.g., the ancient novel, pastoral, biography, thematic studies). Topics specified in *Class Schedule*.

Clas 3950. Aspects of Classical Culture. (3 cr)

Selected topics in the cultural history of classical antiquity (e.g., women in antiquity, Roman diplomacy, slavery, education). Topics specified in *Class Schedule*.

Clas 3993. Directed Studies. (1-4 cr [max 18 cr])

Guided individual reading or study.

Clas 5001. Classical Lyric and Satire. (3 cr; SP-#3001, two literature courses or #)

Greek and Roman lyric poetry; Roman satire.

Clas 5013. Roman Law and Society. (3 cr)

Survey of Roman law from social and historical perspectives. Basic concepts of Roman private law and legal procedure.

Clas 5070. Topics in Ancient Religion. (3 cr; 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 the *Class Schedule*.

Clas 5081. Classical Epic in Translation. (3 cr; SP-#3081)

Homer's Iliad and Odyssey; Virgil's Aeneid; cultural context of epic; development of the hero; epic style; poetics of epic.

Clas 5082. Greek Tragedy in Translation. (3 cr; SP-#3082)

Origins of tragedy; ancient theatres; selected plays of Aeschylus, Sophocles and Euripides.

Clas 5083. Ancient Comedy. (3 cr; SP-#3083)

Greek and Roman comic drama; Aristophanes, Menander, Plautus, Terence. etc. Meets with 3083.

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-Clas/Arth 3008, jr 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-Clas/Arth 3008, jr 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, one 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 Periklean 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 #)

Study of the different theoretical approaches to Greek and Roman mythology. Meets with 3145.

Clas 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr; SP-One 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-One 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-One 3xxx art history 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.

Clas 5340. Practicum in Archaeological Field and Computer Techniques. (3 cr; SP-#3340; 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. Meets with 3340.

Clas 5794. Introduction to Classical and Near Eastern Studies. (1 cr; SP-Grad major or minor or #)

Introduction to core research materials and reference materials in the various disciplines which make up classical studies.

Clas 5940. Topics in Classical Literature. (3 cr [max 9 cr]; SP-#3940; two literature courses or #)

Additional work for graduate cr. 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 basic 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-#)
Assignment on an individual basis to one of a wide variety of special areas of experience in the clinical laboratory.

CLS 5100. Virology, Mycology, and Parasitology for

Medical Technologists. (2 cr; SP—One microbiology course with lab and one biochemistry course; A-F only)
Basic aspects of laboratory diagnosis of viral, fungal, and parasitic infections.

CLS 5102. Principles of Diagnostic Microbiology.

(4 cr; SP—One microbiology course with lab; one biochemistry course; A-F only)
Current techniques used in the laboratory diagnosis of infectious disease; isolation and identification of bacteria and yeasts; antimicrobial susceptibility testing.

CLS 5120. Seminar: Clinical Laboratory Science.

(1 cr [max 3 cr]; S-N only)
Review and discussion of current literature; presentation and discussion of research.

CLS 5125. Practicum Teaching.

(1-2 cr; SP-#; A-F only)
Supervised experience in teaching; development of skills in effective use of instructional materials, tests, and measurements.

CLS 5127. Introduction to Management and

Education I. (1 cr; SP-#; A-F only)
Basic concepts in management and education.

CLS 5128. Introduction to Management and

Education II. (1 cr; SP-5127, MedT 4127; A-F only)
Basic concepts in management and education.

CLS 5129. Elements of Laboratory Administration.

(2 cr; SP-#; A-F only)
Introduction to laboratory administration. Leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, product evaluation, laboratory safety, labor relations, and governmental regulations.

CLS 5130. Practicum in Laboratory Administration.

(2 cr; SP-#; A-F only)
Supervised experience and assignment of specific problems related to laboratory 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 in clinical microbiology.

CLS 5140. Techniques for Teaching.

(2 cr; SP-#; A-F only)
Development of 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 in clinical hematology.

CLS 5165. Advanced Clinical Immunohematology.

(3 cr; SP-#)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical immunohematology.

CLS 5175. Advanced Clinical Chemistry.

(3 cr; SP-#)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical chemistry.

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.

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 the microscopic identification of immature and abnormal cells. Clinical correlation of laboratory findings in hematology and hemostasis.

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.

CLS 5310. Clinical Chemistry I: Lecture.

(2 cr; SP—One organic chemistry course with lab; one biochemistry 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 laboratory.

CLS 5311. Clinical Chemistry I: Laboratory

Applications. (2 cr; SP—One organic chemistry course with lab; 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.

CLS 5320. Clinical Chemistry II: Lecture.

(2 cr; SP-5310 or MedT 4310, one organic chemistry course with lab, one biochemistry course, #; 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.

CLS 5321. Clinical Chemistry II: Laboratory

Applications. (2 cr; SP—One organic chemistry course with lab; one biochemistry course, MedT 4310 or CLS 5310, #; A-F only)
Application of clinical chemistry principles and laboratory techniques in the analysis of serum, plasma, and urine. Focus on tests to evaluate selected disorders. Development of laboratory skills and instrumentation use with emphasis on quality control and technique.

CLS 5768. Advanced Hematology.

(5 10 cr [max 30 cr]; SP-#)
Practical experience in bone marrow collection from patients. Diagnosis of hematological diseases by evaluation and interpretation of 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 laboratory research seminar series.

College of Liberal Arts (CLA)

College of Liberal Arts

CLA 1001. Topics: Freshman Seminar.

(1-4 cr)
Interdisciplinary seminar for freshmen. Topics vary according to instructor and will be specified in the *Class Schedule*.

CLA 1011. Topics: Freshman Seminar, Writing

Intensive. (1-4 cr)
Interdisciplinary, writing-intensive seminar for freshman. Topics vary according to instructor and will be specified in the *Class Schedule*.

College of Veterinary Medicine (CVM)

College of Veterinary Medicine

CVM 1000. Introduction to Veterinary Medicine.

(1 cr; S-N only)
History of the veterinary profession, careers within the profession, and employment trends. Information about admission to the D.V.M. program. Veterinary technology programs. Open to any student with an interest in a veterinary medicine career.

Communication Disorders (CDis)

Department of Communication Disorders

College of Liberal Arts

CDis 1301. 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 (using IPA classification system); 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 3305. 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 3401. Communication Disorders and Cultural Diversity. (3 cr)

Examination of the influence of culture on communication disorders and the role of speech-language pathologists in serving increasingly diverse populations in public schools.

CDIs 3402. 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 the theory, administration and interpretation of behavioral and physiological hearing tests for all age groups. Immittance, pure tone, speech, otoacoustic emissions, and evoked potential measures. Special emphasis on 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 #)

Develop of 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.

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 chronologically 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 wearable 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. (1-4 cr)

Study of issues relevant to the field of communication sciences and disorders. 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/Comparative Literature

College of Liberal Arts

CLit 5331. The Discourse of the Novel. (3 cr; §CSCL 5331)

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.

CLit 5555. Introduction to Semiotics. (3 cr; §CSCL 5555)

Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Application of semiotics to various signifying practices (literature, cinema, daily life).

CLit 5751. Basic Concepts of Cinema. (4 cr; §CSDS 5751, §CSCL 5751)

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.

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; §CSCL 5301)

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.

CSDS 5302. Aesthetics and the Valuation of Art. (3 cr; §CSCL 5302)

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.

CSDS 5751. Basic Concepts of Cinema. (4 cr; CLit 5751, CSCL 5751)

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.

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, familiarity computing fundamentals or #; §CSci 1902)

Programming course for scientists and engineers. C and C++ programming constructs, object-oriented programming, software development, fundamental numerical techniques. Programming exercises and examples from different scientific fields.

CSci 1901. Structure of Computer Programming I. (4 cr; SP-Math 1271 or Math 13710)

Principles of programming and different programming paradigms (message-passing, data-driven, event-driven). Students develop algorithms and data types using a language such as Scheme, techniques such as abstraction, procedures, recursion, and iteration.

CSci 1902. Structure of Computer Programming II. (4 cr; QP-3317; SP-1901 or #; §1113)

Object-oriented programming using a language such as C++ or Java and building on 1901, presenting additional data structures and algorithms. Students use object-oriented approach to implement data structures and their 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 #; §CSci 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 2101. Social, Legal, and Ethical Issues in Computing. (3 cr; QP-At least soph; SP-At least soph or #)

Impact of computers on society. Computer science perspective of ethical, legal, social, philosophical, political, and economic aspects of computing.

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 co-op 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, 3321; SP-1902, 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 4081. Introduction to Software Engineering. (4 cr; QP-3311, 3321; SP-1902 and 2011 or #; no cr for grads in CSci; §5801)

Basic theory and 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 4970. 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 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 #; §EE 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 5284. Computer Aided Design II. (3 cr; QP-3327; SP-2021 or #)

CAD for digital systems. Emphasizes VLSI. Physical design: partitioning, placement and 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.

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 5512. Artificial Intelligence II. (3 cr; QP-5511; SP-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 CSci.

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 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.

Construction Management (CMgt)

University College

CMgt 4011. Construction Documents and Contracts. (2 cr)

Primarily for students in the B.C.M. program or those working in construction. Definition, interpretation, use of drawings, specifications, agreements, bidding forms, general conditions, bonds, contracts, subcontracts, and related documents.

CMgt 4012. Risk Management, Bonds, and Insurance. (2 cr)

Primarily for students in the B.C.M. program or those working in construction. Identification and evaluation of the property, liability, and financial risks of a construction project. Tools of risk control and risk financing. Review of insurance coverage, contract bonds, and underwriting factors.

CMgt 4013. Legal and Ethical Issues in Construction. (2 cr)

Primarily for students in the B.C.M. program or those working in construction. Role of construction management professional in society; broad principles of conduct, as well as specific goals to be achieved in professional performance and behavior and review of mandatory requirements.

CMgt 4021. Construction Planning and Scheduling. (2 cr)

Primarily for students in the B.C.M. program or those working in construction. Project planning, scheduling, and control. Considering and understanding alternatives. Industry techniques (e.g., critical path method) using commercial software on personal computers. Updating and analyzing project schedules.

CMgt 4022. Construction Estimating. (2 cr)

Primarily for students in the B.C.M. program or those working in construction. Purposes and uses of various kinds of estimates. Techniques for performing quantity take-off, organizing bidding process, requesting and analyzing subcontractor proposals, unit pricing, using published resources, and preparing systems-based estimates. Personal computer programs, spreadsheets, and custom applications.

CMgt 4023. Value Engineering. (2 cr)

Primarily for students in the B.C.M. 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 4030. Construction Safety and Loss Control. (2 cr)

Primarily for those in the B.C.M. program or those working in construction. Introduction to construction safety, health, and loss control. Emphasis on hazard recognition, control procedures, and management systems for measuring and evaluating loss control performances in the construction industry.

CMgt 4040. Preparation of Specifications and Technical Writing for Construction Professionals. (3 cr)

Primarily for students in the B.C.M. program or those working in construction. Step-by-step process for research, analysis, and development of written construction documentation, including bidding and contract document relationships, project manual preparation, cost evaluation of building components, and quality assurance methodology. In-depth technical writing exercises exploring levels of product research and evaluation and a variety of presentation formats.

CMgt 4193. Directed Study. (1-4 cr)

CMgt 4196. Construction Management Internship. (3 cr)

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)
Critical theories and methods for examining texts, artistic forms, and discursive practices that reflect and produce a society's culture. Case studies from history and the present, including examples from the visual arts, music, video, film, literature, myth, ritual, and the built environment.

CSCL 1101. Introduction to Literary Cultures. (4 cr)
The literary and cultural history defining the international field of comparative literature. Classical, renaissance, modern, and postmodern periods as decisive moments in the emergence of this field. Readings in literary, historical, and philosophical texts.

CSCL 1201. Introduction to Visual Cultures. (4 cr)
The practices of visual representation that have come to play a central role in the interdisciplinary field of cultural studies. Contexts in which these representations circulate, and the "textual systems" of these practices.

CSCL 1301. Reading Culture: Theory and Practice. (4 cr)
Modes of expression through primary works and theoretical systems. How discourse creates and contests social borders, replicates cultures, and attaches differential privilege to practices of particular historical moments and locations. Discursive persuasion and authority.

CSCL 1401. Reading Literature: Theory and Practice. (4 cr)
Introduction to comparative analysis of literature, its genres, the relation of texts to their contexts of production and reception, and the decisive turning points in the history of world literatures.

CSCL 1921. Introduction to Film Study. (3 cr)
Fundamentals of film analysis and an introduction to the major theories of the cinema, presented through detailed interpretations of representative films from the international history of the cinema.

CSCL 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 3173. 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 3321. Theories of Culture. (3 cr)
Examination of three prevalent theoretical perspectives on culture—philosophical, anthropological, and aesthetic—as they converge in the work of writers who have contributed to our contemporary conception of cultural diversity.

CSCL 3331. Science and the Humanities. (3 cr)
The sciences and humanities battle over "truth" and "reality," while technology recasts the world of knowledge and work. The question of texts-as-truth also facilitates the ongoing religious attacks on science in this millennial moment.

CSCL 3361. Visions of Nature: The Natural World and Political Thought. (4 cr; §EEB 3361)
Theories about 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. Lectures, discussions, film assignments.

CSCL 3366. 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 3412. 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 3413. Psychoanalysis and Literature Part II: Post Freudian Criticism. (3 cr)
Impact of psychoanalytic discourses on literary studies and vice versa. Archetypal of Jung; structural of Lacan; post-structural of Derrida and Kristeva; feminist psychoanalysis of Mitchell; self/object of Kernberg and Kohut; the unconscious and society of Deleuze and Guattari.

CSCL 3421. Culture and the Production of Modern Identity I: 1600-1750. (3 cr)
History of cultural, perceptual and/or conceptual changes in Western societies, 1600 to 1750, concerning new and conflicting understandings of the human imagination, subjectivity, identity, and the body; addressed through philosophy, literature, visual arts, music, pedagogical and medical treatises, and manners.

CSCL 3422. 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 3456. 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 3458. The Body and the Politics of Representation. (3 cr)
Western representation of the human body, 1500 to present. Body's appearance as a site and sight for production of social and cultural difference (race, ethnicity, class, gender). Visual arts, literature, music, medical treatises, courtesy literature, erotica.

CSCL 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; Knowledge of German not required; cr toward major or minor requires reading in German)
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.

CSCL 3910. Topics in Cultural Studies and Comparative Literature. (3 cr)
Topics specified in *Class Schedule*.

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 4990. 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 5154. Theoretical Constructions of Space. (3 cr)
Inquiry into theories of space drawn from various disciplines including anthropology, architecture, geography, history, landscape design, philosophy, planning, and sociology. Focus on sociopolitical interests that are served and sustained; emphasis on opportunities and implications for personal identity.

CSCL 5256. Suburbia. (3 cr)
Suburbia from origins in 18th-century England to the present. Historical changes and present challenges, especially in America. Ideology, mythology, planning, development, geography, transportation, the family. Specific sites and designs; representations in film, television, popular literature, and music.

CSCL 5301. Society, Ideology, and the Production of Art. (3 cr; §CSDS 5301)
Recent critical theories on the relation of the arts to social and ideological forces; selected artifices from Western culture (Renaissance to 20th century; high, popular, and mass culture). Music, visual art, literature.

CSCL 5302. Aesthetics and the Valuation of Art. (3 cr; §CSDS 5302)
Society, ideology, and aesthetic value considered in light of recent critical theories of visual art, music, and literature. Meditations on place, social class, gender and ideology on aesthetic judgment in post-Renaissance Western culture.

CSCL 5331. The Discourse of the Novel. (3 cr; §CLit 5331)

Comparative study of the novel, 18th century to present. Its relations to ordinary language practices, emergent reading publics, technologies of cultural dissemination, problems of subjectivity, and its role in articulating international cultural relations.

CSCL 5555. Introduction to Semiotics. (3 cr; §CLit 5555)

Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Application of semiotics to various signifying practices (literature, cinema, daily life).

CSCL 5711. Sociocriticism. (3 cr)

Sustained consideration of the modern tradition of sociological reflection on literature. Early and late Birmingham School, Frankfurt School, Bakhtin circle, and the various French initiatives associated with both *Les Temps Modernes* and *Tel Quel*.

CSCL 5751. Basic Concepts of Cinema. (4 cr; §CLit 5751, §CSDS 5751)

Examination of the cinema as an object of theoretical and historical analysis. Emphasis on the concepts that have emerged to radically transform the scope and aim of film analysis since the 1960s. Readings of filmic and theoretical texts.

CSCL 5771. Basic Concepts of Literary Study. (3 cr)

Examination of literary discourse as an object of theoretical and historical analysis. Emphasis on the concepts that have emerged to radically transform the scope and aim of literary analysis since the 1960s. Readings of literary and theoretical texts.

CSCL 5835. Richard Wagner's "Der Ring des Nibelungen": Music, Myth, and Politics. (3 cr; 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.

CSCL 5910. Topics in Cultural Studies and Comparative Literature. (3 cr [max 24 cr])

Topics specified in *Class Schedule*.

CSCL 5993. Directed Study. (1-3 cr [max 9 cr])

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 licensure)

Curriculum organization, instruction, management, assessment, and professional decision making.

CI 5183. Applying Instructional Methods in the Elementary Classroom. (1-2 cr; SP-Foundations of ed major or elem ed initial licensure; S-N only)

Supervised experience in elementary classrooms.

Dance (Dnce)

Department of Theatre Arts and Dance

College of Liberal Arts

All ballet, modern, and jazz technique classes through day school require a placement audition except 1001, 1101, and 1201. Contact the dance program office for audition times and dates.

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]; SP-#, Δ)

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 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]; SP-#, Δ)
Topics specified in *Class Schedule*.

Dnce 3601. Dance Composition 1. (3 cr; SP-1020 or Δ, ¶|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, ¶|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-¶|technique course, 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, ¶|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, ¶|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. (3 cr; QP-Sr, Dnce or Th major; SP-Sr, Dnce or Th major; S-N only)
Seminar for completion of the major project. Meets with Th 4901.

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]; SP-#, Δ)
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-3011)
Discussion of novels, short stories, plays, and articles complemented by structural, stylistic, and vocabulary building exercises.

Dan 4001. Beginning Danish. (2 cr; SP-§1001, passing score on GPT in another language or grad student)
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 student)
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 student)
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 student)
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 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 includes 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. (1-4 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.

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.

DH 3126. Oral and Maxillofacial Radiology Clinic I. (0 cr; A-F only)

Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 3131. Periodontology I Lecture. (1 cr; A-F only)

Periodontal anatomy; physiology and etiology of periodontal diseases. Clinical, histopathological, and pathogenesis of gingivitis and periodontitis, as well as the role of genetics, tobacco use, and systemic disorders. Preventive and therapeutic procedures associated with diagnosis, prognosis, treatment planning and initial phase of periodontal therapy.

DH 3132. Applied Nutrition in Dental Hygiene Care. (2 cr; A-F only)

Principles of diet and nutrition applied to dental hygiene patient care; skills in dental dietary counseling.

DH 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. (1-4 cr [max 6 cr]; S-N only)

Individually arranged study, instruction, or research with faculty to meet student needs and interests.

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 needs through case presentations. 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. (1-4 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 needs through case presentations. 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. (1-6 cr; S-N only)

DH 4228. Advanced Dental Hygiene Clinical Experience II. (1-6 cr; S-N only)

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 0621. Introduction to Drafting. (0 cr)

Architectural drafting practice and the use of drafting instruments. Line conventions, lettering, orthographic drawings, paraline drawing, architectural symbols, and vocabulary as related to interior design. (Independent and distance learning only.)

DHA 1101. Introduction to Design Thinking. (4 cr; A-F only)

Theories and processes that underpin design thinking. Investigate interactions between humans and their natural, social, and designed environments where purposeful design helps determine the quality of interaction; design professions; the power of design.

DHA 1171. Freshman Seminar in Design, Housing and Apparel. (1-3 cr; SP-Fr only)

Small group seminar for freshmen only on a topic in design, housing, or apparel announced in advance.

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)

Study of basic clothing assembly from a micro to macro perspective. Can be taken in lieu of clothing construction proficiency exam.

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 and principles in the context of observational drawing. An integrative approach to two-dimensional design, three-dimensional design, and drawing gives students a broad conceptual framework for design exploration. Perceptual aspects of visual forms are emphasized.

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 introduced through lectures, demonstrations, extensive studio work, and critiques.

Emphasis on effective use of color in two- and three-dimensional design applications by studying traditional color systems, perception, and interaction.

DHA 1315. Foundations III: The Graphic Studio. (4 cr; QP-DHA major or premajor, 1325; SP-DHA major or premajor, 1311 or 1312 or #: A-F only)

Overview of the graphic design process including creative procedure, terminology, and technology. Introduction to the use of current computer applications. Students gain skills in digital illustration and page layouts, and image scanning and manipulation.

DHA 1601. Interior Design Studio I. (4 cr; QP-DHA premajor; SP-DHA premajor; 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 major or premajor, 1601 with C minimum; A-F only)

Introduction and emphasis of interior design programming as a method for understanding the behaviors and requirements of humans in spaces. Explore the use of color in three-dimensional environments and continue development of communication skills. Problem-solving through design exploration.

DHA 2213. Textile Analysis. (4 cr; A-F only)

The study of physical, chemical, and biological characteristics of fibers, yarns, textile structures and finishes, and their effect on the performance and appearance of textile products. Product categories include 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-DHA major or premajor, 1221 or pass sewing proficiency, 1323, 1328; SP-DHA major or premajor, 1201, 1221 or pass sewing proficiency, 1312; A-F only)

Theories and methods used to solve problems in designing clothing for a variety of user groups. Develop an understanding of the relationship of a 2-dimensional pattern shape to a 3-dimensional body. Introduction to basic flat pattern, draping, and fitting principles.

DHA 2222. Clothing Design Studio II. (4 cr; QP-DHA major, 1231, 3211; SP-DHA major, 2221, pass portfolio review; A-F only)

The design process in designing clothing for a specific user group. Advanced principles and methods of developing patterns for the body including advanced flat pattern, draping, and fitting principles. Computer aided design tools used as appropriate for illustration and pattern making.

DHA 2311. Drawing and Illustration. (3 cr; QP-DHA major or premajor; SP-DHA major or premajor; A-F only) Emphasis on advanced drawing skills and introduction of illustration concepts and techniques. Illustration of assigned concepts, stories, and ideas, emphasizing the integration of design elements and principles.

DHA 2334. Computer Applications I: Digital Composition for Design. (3 cr; QP-DHA major or premajor, 1301, 1334; SP-DHA major or premajor, 1311, 1312, 1315; A-F only)

Composition of visual elements in the electronic realm using the computer as a tool to create designs for traditional media and the digital environment.

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, and the expressive potential of type explored through reading, research, exercises, and design production. Sequential studies will follow the design process from problem-solving through exploration, experimentation, selection, critique, and refinement.

DHA 2351. Graphic Design I: Text and Image. (3 cr; QP-3550, DHA major, pass portfolio review; SP-2345, DHA major, pass portfolio review; A-F only)

Emphasis on the composition of visual information using grid structures to integrate text and image. Exploration of informational and expressive aspects of graphic design and hierarchical relationships of text elements. Investigation of methods of text layout that enhance communication.

DHA 2385. Design and Factors of Human Perception. (4 cr; QP-DHA major, pass portfolio review; SP-DHA 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 ¶1101; A-F only)

Introduction to housing covering the social, economic, and psychological aspects of housing from individual, household, and community perspectives.

DHA 2402. Residential Technology. (3 cr; QP-1101; SP-1101 or ¶1101; 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 ¶1101; 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-DHA major, pass portfolio review, #: SP-DHA major, 1602 with C minimum, pass portfolio review; A-F only)

External and internal forces that influence the design of the interior environment including neighborhood, adjacent structures, regional context, and diverse cultures. Expanding presentation skills and visual communication of the design process continues.

DHA 2604. Interior Design Studio IV. (4 cr; QP-#: SP-DHA major, 2603 with C minimum; A-F only)

Study the relationship between exterior and interior design as it relates to building construction including methods and materials, principles of structure, and mechanical systems. Emphasis on integration of interior architectural components, systems, and details with the design concept utilizing 3-D CAD.

DHA 2612. Environmental Systems and Life Safety. (4 cr; QP-DHA major, pass portfolio review; SP-DHA major, pass portfolio review; A-F only)

Environmental issues from global to interior spaces. Impact of building codes, environmental issues, legislation, and social awareness on designing for life safety, health, universal design, and earth's resources. Materials and resources used in interiors and their functional and aesthetic relationship 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 and principles of design are merged with functional and aesthetic human aspects of lighting design. Examine applications and types of lighting technology to solve lighting design problems for interior spaces. Explore the 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 the design and visualization of interior space. AutoCAD software used on a Windows-based system.

DHA 3217. Aesthetics of Clothing. (3 cr; QP-3215, 3216; SP-2213, 2214; A-F only)

Perception of the clothed body as a designed unit and applications in specific laboratory problems to focused audiences.

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 and non-tailored clothing structures. Experiment with a variety of materials and structures using traditional and innovative methods. Basic principles of the manipulation of materials and structures are applied to a series of garments.

DHA 3224. Clothing Design Studio IV. (4 cr; QP-DHA major, 3211, 3232, 5218; SP-DHA major, 3223; A-F only)

Use of the design process in designing clothing for special needs. Conduct and apply research in design of specialized clothing for use in situations requiring thermal protection, impact protection, accommodation for mobility, and to facilitate and/or increase body function.

DHA 3241. Retail Buying. (3 cr; QP-1211; SP-1201; A-F only)

Principles and mathematics of merchandise inventory control and the merchandise selection process.

DHA 3243. Visual Merchandising. (3 cr; QP-1101, 1211; SP-1101, 1201; A-F only)

Study of the retail store environment to address the physical and psychological effects that initiate and motivate consumers' behavior. Aspects of merchandise display include creativity, department layout, fixturing, lighting, cross merchandising, visual resources, signing, and maintenance.

DHA 3245. Nonstore Retailing. (3 cr; 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)

Advanced foundations course focusing on the use of color and form representation in two-dimensional surface applications. Emphasis on historical use of color and spatial representation in visual communication.

DHA 3352. Graphic Design II: Identity and Symbols. (3 cr; QP-3351, DHA major, pass portfolio review; SP-2345, 2351, DHA major, pass portfolio review; A-F only)

Continued investigation of graphic design. Representation of abstract ideas through symbols. Development of visual identity systems.

DHA 3353. Graphic Design III: Packaging and Display. (3 cr; QP-3352, DHA major, pass portfolio review; SP-2345, 2351, 3352, DHA major, pass portfolio review; A-F only)

Application of graphic design principles to three-dimensional projects. Principles of three-dimensional design and space applied to the design of effective and innovative labeling and packaging.

DHA 3605. Interior Design Studio V. (4 cr; QP-#: SP-DHA major, 2604 with a C minimum; A-F only)

Advanced interior design projects dealing with small to medium scale spaces. Emphasis on special-needs populations.

DHA 3606. Interior Design Studio VI. (4 cr; QP-#: SP-DHA major, 3605 with a C minimum; A-F only)

Advanced interior design projects dealing with large scale spaces. Emphasis on environmental concerns.

DHA 3614. Interior Design Ethics and Professional Practice. (4 cr; QP-DHA major, pass portfolio review; SP-DHA major, 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 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 4212. Dress, Society, and Culture. (4 cr; QP—1101, jr; SP—1101, jr; A-F only)

Contemporary dress from diverse cultures within and outside the United States is analyzed using social science concepts. Course emphasizes dress as a nonverbal communication system.

DHA 4215. Quality Assurance: Softlines. (4 cr; QP—3215, 3216; SP—2213, 2214; A-F only)

Quality assurance policies and objectives for softlines including apparel and other sewn products. Economics of quality, design for product effectiveness and reliability, quality specifications, conducting tests and interpreting results, inspection, acceptance sampling, and vendor relations.

DHA 4217. International Developments in Textiles and Apparel. (4 cr; SP—1201; A-F only)

Insight into the nature of production and labor, trade, and marketing in textile, apparel, and related goods in a global setting.

DHA 4225. Clothing Design Studio V. (4 cr; QP—DHA major, 5231; SP—DHA major, 3224; A-F only)

Principles of mass production processes; market research/information and implementation, designing to meet the needs of the market, production pattern making, grading, marker-making, cutting, production sewing systems, finishing, and cost analysis. Application of market research in designing a line of clothing.

DHA 4226. Clothing Design Studio VI. (4 cr; QP—DHA major, 5231; SP—DHA major, 4225; A-F only)

Synthesis of clothing design work based on concepts examined in previous studio classes. Develop strategies for the public promotion of a clothing line and individual strategies for the promotion of career goals. Exhibition and portfolio presentations.

DHA 4241. Retail Promotion. (3 cr; QP—1211, Mktg 3001 or equiv; SP—1201, Mktg 3000 or equiv; A-F only)

Integration of communication theory and theories of consumer behavior with the elements of retail promotion; advertising, sales promotions, point-of-purchase communications, and personal selling.

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; #3352 ; SP—2345, 2351, 3352, DHA major, pass portfolio review; A-F only) Further exploration of expressive visual communication of words. Both the fundamental legibility of 'the invisible art' and overt expression through type will be addressed. An extended typographic project will be completed.

DHA 4350. Design Process: Materials. (3 cr [max 6 cr]; QP—DHA major, pass portfolio review; SP—DHA major, pass portfolio review; A-F only)

Focus on the relationship between the material of production and the design problem, and its most effective solution. Develop production skills in the specified medium while gaining a sensitivity to the material's expressive potential.

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 multifaceted 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—4354, DHA major, pass portfolio review ; S-N only)

Preparation of a professional portfolio and discussion of professional issues.

DHA 4365. 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)

Study historical perspectives, current status of multifamily housing, management approaches, user perspectives and psycho-social impacts of housing and community design, basics of management finance and maintenance for multifamily buildings.

DHA 4465. Housing in World Perspective. (3 cr; QP—3463; SP—2401, 2463 or #; A-F only)

Evaluate theories and concepts to understand housing policies and housing choices of individuals, families, and households in developed and 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—DHA major, 3606 with C minimum, 3614; A-F only)

Advanced studio course that emphasizes sense of place and the contribution of artifacts to the creation of interior environments. Focus is on historic precedent, adaptive use, renovation, and universal design projects.

DHA 4608. Interior Design Thesis. (6 cr; QP—#; SP—DHA major, 4607 with C minimum; A-F only)

Discussion of current issues that affect interior design research and practice. Study of research methods used for programming and solutions, and development of a comprehensive independent interior design project generated from research conducted by student.

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—DHA major, 5334; SP—DHA major, 4334; A-F only)

Focus on the integration of design knowledge with computer applications. Experience using raster- and vector-based programs for illustration.

DHA 5382. Digital Sound and Video. (3 cr; QP—DHA major, 5334 or #; SP—DHA major, 4334 or #; A-F only)

Design solutions involving time-based media emphasizing sound and video. Explore these two components and their creative processes, and as well as electronic publishing via the Internet.

DHA 5383. Modeling and Animation. (3 cr; QP—DHA major, 5334 or #; SP—DHA major, 4334 or #; A-F only)

Investigation of three dimensional modeling and animation in effective communication and electronic design.

DHA 5385. Internet-Based Media. (3 cr; QP—DHA major, 5334 or #; SP—DHA major, 4334 or #; A-F only)

Design interactive presentations using computers with varying operating systems for presentation and distribution via the internet and the World Wide Web. Focus on electronic publishing on the internet and the development of internet-based communication.

DHA 5388. Design Planning, Analysis, and Evaluation. (3 cr; QP—DHA major, 3353 or grad student or #; SP—DHA major, 4354 or grad student or #; A-F only)

Experience in design planning, research, and development. Emphasis on preliminary research including theoretical, applied, and legal aspects of design projects and processes. A variety of planning and developmental models will be used. Design prototyping, testing, and analysis is included.

DHA 5399. Theory of Electronic Design. (3 cr; QP–DHA major, sr or grad student or #; SP–DHA major, sr or grad student or #; A-F only)
Investigate electronic documents, media, and methods, and their relationship to communication and design. Emphasis on the development of a new understanding of the communication of information in a visual, dynamic, hyper- and multimedia-based environment.

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 5467. 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 Authors. (3 cr; SP–Reading knowledge of Dutch)

A single author or a particular historical period of Dutch and/or Flemish literature studied in depth. Past topics have included late 19th-century Dutch novels, colonial novels, and literature of the Golden Age. All primary literature is read in the original.

Dtch 3510. Topics in Dutch Culture. (3 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 Authors in Translation. (3 cr; SP–No knowledge of Dutch required)

A single author or a particular historical period of Dutch and/or Flemish literature studied in depth. All primary and 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 student)

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 student)

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 student)

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 student)

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)

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.

East Asian Studies (EAS)

*Institute for Global Studies
College of Liberal Arts*

EAS 3013. Introduction to East Asian Art. (3 cr; SP–\$Arth 3013)

A selective examination of representative works of art produced in China, Korea, and Japan from the Neolithic era to modern times. Nearly every major type of object and all major styles are represented.

EAS 3211. Geography of East Asia. (3 cr; 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 3465. 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 3467. 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 3468. 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 and Japan's emergence as an industrial society and world power in the 1920s; rise of militarism, World War II in the Pacific; political reform, economic resurgence, and cultural change in the postwar era.

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 4467. Politics and Market in Contemporary Japan. (3-4 cr; SP-\$Pol 4467; Pol 1054 or 3051 or non-pol sci grad student 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.

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 cr toward major; SP-\$CSCL 3361; soph or jr or sr; biological sciences students may not apply cr toward 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 4014. Ecology of Vegetation. (3 cr; QP-Biol 3008 or Biol 5041 or Biol 5841, 1 qtr statistics; SP-Biol 3007, 3407)
Methods of describing, sampling, and classifying vegetation; spatial and temporal variation of vegetation and ecosystem properties on landscapes; theory of structure and dynamics of terrestrial communities and ecosystems. Field trips to local ecosystem types; analysis of quantitative data.

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 4609. 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. Earth System: Geosphere/Biosphere Interactions. (4 cr; QP-Geo 3202, Geo 3301; SP-\$Geo 4631; Biol 3407 or Geo 3301 or #; A-F only)
Effects of Earth's climate on various time scales ranging from evolution of photosynthesis to plate tectonics to orbital variations to interannual variations. Positive and negative feedbacks from biosphere and geosphere that amplify or dampen climate change.

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; 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 #; 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 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 and intro statistics or #; SP-intro biology and 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 5122. 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 of biological sciences; 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, use and value of museums, etc.

EEB 5961. Decision Analysis and Modeling in Conservation Biology. (3 cr; QP–Grad in Conservation Biology program; SP–Grad in Conservation Biology program 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 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 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 1111. Honors Course: Principles of Microeconomics. (4 cr; QP–\$1002, \$1005, \$1104; knowledge of plane geometry and intermediate algebra at level of GC 0623 and GC 0631; SP–\$1101, \$1104, 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. Emphasis on algebra, geometry, basic logic, and proofs.

Econ 1112. 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 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; SP–\$4031; 1101, 1102 or equiv; not for Econ majors)
Discussion of American economic problems and 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. The Prospective World Economy. (3 cr; QP–1101, 1102 or equiv; SP–\$4041; 1101, 1102 or equiv; not for Econ majors)
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 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.

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 3105. Managerial Economics. (4 cr; QP–\$3101, \$BGS 3001; 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 3111. 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 3112. Honors Course: Intermediate Macroeconomics. (4 cr; QP–3102; 3101 or equiv; B avg recommended; SP–\$3102; 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 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 Anti-Trust 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 in *Class Schedule*]; SP-1101, 1102 or equiv [others may be 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 need to confirm a topic of study with their faculty supervisor or with the director of undergraduate studies before beginning, otherwise credit will not be received.

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 4021. 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 4109. 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, #; 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 seven-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 seven-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, 1 qtr calculus, Stat 3011-3012 or equiv; familiarity with computers; SP-1101, 1102, or equiv, Math 2243 or equiv, Stat 3011-3022 or equiv; familiarity with computers) Data analysis and quantitative methods in economics; violation of classical regression model assumptions and consideration of modified estimation procedures that retain desirable properties; multi-equation models. Computer applications and interpretation of empirical results.

Econ 4261. Econometric Analysis. (2 cr; QP-3101 or equiv, Math 1251-1252, Math 1261 or equiv, Stat 5121-5122 or Stat 5131-5132-5133; SP-3101 or equiv, Math 2243 or equiv, Stat 4101-4102 or Stat 5101-5102) Review of basic linear regression model and its variants; panel data, censored and truncated regression, discrete choice models; time series and simultaneous equation models. This seven-week course meets with 8201.

Econ 4262. Econometric Analysis. (2 cr; QP-5261; SP-4261) Review of basic linear regression model and its variants; panel data, censored and truncated regression, discrete choice models; time series and simultaneous equation models. This seven-week course meets with 8202.

Econ 4263. Econometric Analysis. (2 cr; QP-5262; SP-4262) Basic linear regression model and its variants; panel data, censored and truncated regression, discrete choice models; time series and simultaneous equation models. This seven-week course meets with 8203.

Econ 4264. Econometric Analysis. (2 cr; SP-4263) Basic linear regression model and its variants; panel data, censored and truncated regression, discrete choice models; time series and simultaneous equation models. This seven-week course meets with 8204.

Econ 4301. 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; not open to Econ majors; SP-1101, 1102 or equiv) Economic evolution in Latin America since 1950. Issues addressed include trade liberalization, poverty, inflation, and development strategies in selected Latin American countries. Theory and 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 4331. 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 4401. 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 4421. 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 4431. 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 4432. 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 4439. 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 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 4619. Honors Course: Environmental Valuation. (4 cr; QP–3101, 3103 or equiv, 1 qtr calculus; SP–3101 or equiv, Math 1271 or equiv)
Principles of cost-benefit analysis used for valuing the environment and costs of pollution; definition, measurement, and valuation of benefits and costs. Economic growth, sustainable growth; economic, ecological and ethical issues in use of non-renewable and renewable resources, optimal rate of use. Optimal pollution control.

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 4629. 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 4631. Industrial Organization and Anti-Trust 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 4639. Honors Course: Industrial Organization and Anti-Trust 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 4729. 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 4739. 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. Business Cycles. (3 cr; QP–3101, 3102, Stat 3011 or equiv; SP–\$4749; 3101, 3102 or equiv; Stat 3011 or equiv)
Development and calibration of the growth model; effects of policies on output, employment, other aggregate variables. Documentation of business cycle facts; estimation of business cycles' cost. Real business theory and prediction of business cycle facts. Money in the augmented model.

Econ 4749. Honors Course: Business Cycles. (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 and calibration of the growth model; effects of policies on output, employment, other aggregate variables. Documentation of business cycle facts; estimation of business cycles' cost. Real business theory and prediction of business cycle facts. Money in the 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, Stat 3011)
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 4759. 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. Includes theoretical concepts and empirical evidence.

Econ 4831. Cost-Benefit Analysis. (3 cr; QP–3101, 3103 or equiv; SP–3101 or equiv)
Principles for evaluation of benefits and costs of public projects or programs. Issues connected with definition and measurement of benefits and costs. Rate of return and rate of discount. Market imperfections, risk, and uncertainty. Case studies of applications of theory.

Econ 4960. Topics in Economics. (3 cr [max 6 cr]; QP–3101, 3102, 3103 or equiv [may change based on topic]; 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, □)
Students need to confirm a topic with their faculty supervisor or with the director of undergraduate studies before beginning, otherwise credit will not be received.

Econ 4993. Directed Study. (1–4 cr; QP–#; SP–#, Δ, □)
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, 1 qtr calculus, 1 qtr linear algebra, grad student or #; SP–3101, 3102, or equiv; Math 1271 or equiv; Math 2243 or equiv, grad student 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, 1 qtr calculus, 1 qtr linear algebra, grad student or #; SP–3101, 3102 or equiv; Math 1271 or equiv; Math 2243 or equiv; grad student 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.

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. federal government.

Education and Human Development (EdHD)

College of Education and Human Development

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)
Exploration of self as teacher, the culture of teaching, students as learners, learning contexts, and societal influences on teaching and 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 #; one psych course recommended; SP–MEd/init lic student or CLA music ed or preteaching major or #; one 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 or preteaching major or #; SP-§EdPA 5090, MEd/init lic student or CLA music ed or preteaching major or #; A-F only)
Readings in history, philosophy, social sciences, and law, revealing diverse educational values in pluralistic American society, multiple expectations of schools, issues of civil liberties, rights, community; attention to varying cultural backgrounds of students, family circumstances, exceptional needs.

EdHD 5007. Technology for Teaching and Learning. (1.5 cr; QP-§CI 5300, §EdHD 5007; MEd/init lic or CLA music ed or preteaching major or #, basic computer skills; SP-§CI 5300, §EdHD 5007; MEd/init lic or CLA music ed or preteaching major or #, basic computer skills; A-F only)
Diverse educational technology in K-12 classrooms and the issues associated with their effective use. Computer technologies are used to stimulate personal productivity, communicate with other users, and enhance the teaching and learning processes.

EdHD 5009. Human Relations: Applied Skills for School and Society. (1 cr; QP-¶EdHD 5005; SP-¶EdHD 5005; A-F only)
Addresses 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, and teaching in diverse educational settings.

Educational Policy and Administration (EdPA)

Department of Educational Policy and Administration

College of Education and Human Development

EdPA 3010. Special Topics for Undergraduates. (1-3 cr)
Inquiry into educational policy and administration problems and issues.

EdPA 3021. Introduction to the Historical Foundations of Modern Education. (3 cr; SP-§Hum 4021)
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 3023. Introduction to the History of Western Educational Thought. (3 cr; SP-§Hum 4023)
Great educational classics of Western civilization: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, and others.

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; SP-§Hum 4021)
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; SP-§Hum 4023)
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 practical reflection on moral education, virtues, and principles.

EdPA 5041. Sociology of Education. (3 cr; SP-§Soc 5455)
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-#)
Intensive weekend workshop introduces participants to cultural variables of leadership that influence functioning of cross-cultural groups. Methods include lectures, case studies, discussion, problem-solving exercises and simulations.

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, and youth roles in the family. Well-defined analyses of contextual roles. Complexity of policy for appropriate educational and 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. Class project.

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 varying or opposing views on 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])
Issues of educational policy and administration.

EdPA 5087. Seminar: Educational Policy and Administration. (1-3 cr [max 24 cr])
Issues of educational policy and administration.

EdPA 5095. Problems: Educational Policy and Administration. (1-3 cr [max 24 cr])
Issues of educational policy and administration.

EdPA 5096. Internship: Educational Policy and Administration. (1-9 cr [max 24 cr])
Issues of educational policy and administration.

EdPA 5101. International Education and Development. (3 cr)
Introduction to comparative and international development education and 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 of education and development 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, multidimensional policy-oriented frameworks for international education found in practices of U.S. and other universities; conceptual development of international education and its practical application to programs, to employment choices in global careers, and to pedagogy.

EdPA 5128. Anthropology of Learning. (3 cr; SP-§Anth 5128)
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 5303. Managing the Learning Organization. (3 cr; A-F only)
Examines schools, colleges, and other human service organizations that are centered on learning. Focuses on perspectives and skills needed to manage organizations effectively.

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 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 5352. Projective Leadership for Strategic Learning Communities. (3 cr)
Explores numerous trends and changes facing society, culture, and education from a strategic learning community perspective; designed to help students “futurize the present.”

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 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; SP-\$WCFE 5412)
Theory and practices of learning by doing. Focuses on the educator’s personal engagement in the actual process to understand the technical, motivational, and evaluative aspects of experiential learning.

EdPA 5381. The Search for Children and Youth Policy in the U.S. (3 cr)
Review of contemporary policy issues affecting children and youth in the U.S. and South Africa; identify national standards, norms and principles of youth development; conflicting expectations facing policy-makers; and search for the critical content of youth policy.

EdPA 5396. Field Experiences in PK-12 Educational Administration. (2-6 cr; S-N only)
Field experiences and/or internships arranged for students seeking licensure as PK-12 principals and superintendents. Content and credit dependent on licensure requirements and specified in individual field experience agreements.

EdPA 5501. Principles and Methods of Evaluation. (3 cr; SP-\$EPsy 5243)
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)
Use and application of cost-effectiveness, cost-benefit, cost-utility, and cost-feasibility in evaluation of educational problems and programs.

EdPA 5701. American Higher Education. (3 cr; A-F only)
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-EdPA 5201; SP-EdPA 5001)
Broad range of issues involving students and faculty in colleges and universities, including: college student development, curricular and extracurricular activities, faculty work and development, and 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; A-F only)
Scope, administration, coordination, and evaluation of programs in college and university student affairs.

EdPA 5728. Two-Year Postsecondary Institutions. (3 cr; A-F only)
Present status, development, functions, organization, curriculum, and trends in postsecondary, but nonbaccalaureate, institutions.

EdPA 5732. The Law and Postsecondary Institutions. (3 cr; A-F only)
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; SP-\$EdHD 5001; 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, handicapism, 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. (3 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)
Basic 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 and instruction. Emphasis on instructional design, learning theories, experience, individual differences, evaluation, tests and measurement, and technology. Implications for curricular and instructional design in higher education, continuing education, and professional and 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 antisocial 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 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 5217. Proseminar in Educational Psychology. (3 cr; QP-8210 or #; SP-5216 or #; A-F only) Survey and examination of the types of research proposed or done by faculty and students in educational psychology.

EPsy 5221. Basic Principles of Educational Measurement. (3 cr; QP-5260 or equiv; SP-5261 or equiv)

Fundamental 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; SP-5EdPA 5501)

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-5EdPA 5524; 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)

Introduction to statistics with an 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 studies, and introduction to inferential techniques.

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)

General, introductory computer literacy course to familiarize students with personal computers and computing resources at the U of M. 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 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-One course in counseling or career development; SP-One course in counseling or career development) 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-One course in child development, 5601 or equiv; SP-One course in child development, 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 the assumptions, principles, and procedures of the 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)

A 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. (3 cr; A-F only)

Selected information in genetics; anatomy, physiology, and kinesiology; central and peripheral nervous system; prenatal, perinatal, and postnatal development; physically disabling conditions; management and educational 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. (3 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.

EPsy 5641. Foundations of Education for Individuals Who Are Deaf or 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 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 ed 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 or 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)

The 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-5640, 5644 or #)

Design and development of portfolios for various models of educational service delivery systems for individuals with hearing loss, emphasizing consultation skills, curriculum management and modifications, material and 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 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 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. (4 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 sr or grad student ; SP-Honors sr 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. Early Intervention and Prevention. (3 cr)

Theory and research base for school-based primary and secondary prevention programs to promote academic and social competence of children and youth. Emphasis on programs and approaches promoting healthy development of children (birth to grade 12) for ongoing school success.

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 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 1701. 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 ¶12373 or ¶12573)

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 Transition Laboratory. (.5 cr; QP-1400, 3010, 3061; SP-§2101)

For students who completed EE 1400, 3009, 3010, and 3061 but not 3400 under quarter system. In combination with EE 1400, completes the EE 2002 semester 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 of 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 of a semester.

EE 2301. Introduction to Digital System Design. (4 cr; QP-IT soph or jr or sr; SP-IT soph or jr or sr)
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 Computer Architecture and Assembly Language Programming. (3 cr; QP-CSci 3113; SP-CSci 1113 or CSci 1901)
Basic computer organization and assembly language programming. Instruction types, data structures and addressing modes, subroutines, assembler usage, and programming techniques. Arithmetic and logical operations, floating point arithmetic, input/output, interrupts.

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. (.75 cr; QP-3400; SP-3015)
For students who completed EE 1400, 3009, 3010, 3061, and 3400 but not 3401 under quarter system. In combination with EE 3400, completes the EE 3101 semester 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. Electromagnetic Fields and Waves. (4 cr; QP-Phys 1253, Math 3252; SP-Phys 1302 or Phys 1402, Math 2263 or Math 2374 or Math 3574)
Field properties of electricity and magnetism. Interaction with dielectric and magnetic materials. Time-varying electromagnetic fields. Propagation and reflection of electromagnetic waves. Metallic and optical wave guides.

EE 3961. Industrial Assignment I. (1 cr; QP-ECE co-op; SP-ECE co-op)
Industrial work assignment in Electrical and Computer Engineering co-op program. Grade based on student's written report of semester's assignment, but deferred until completion of 4961.

EE 4111. Analog Electronics Design With Operational Amplifiers. (4 cr; QP-3011, 3062; SP-3015, 3115)
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 and switching voltage regulators.

EE 4231. Linear Control Systems: Designed by Input/Output Methods. (3 cr; QP-Upper division EE or grad student in IT major, 3012, 5002 or #; SP-Upper div IT or grad student in IT major, 3015, 4541 or #)
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-Upper div IT or grad student in IT major, 3012, 5002 or #; SP-Upper div IT or grad student in IT major, 3015, 4541 or #)
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)
Lab to accompany 4231.

EE 4237. State Space Control Laboratory. (1 cr; QP-#; SP-4233 or ¶4233)
Lab to accompany 4235.

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-Upper div IT or grad student, 3351, 3352; SP-Upper div IT or grad student, 2301, 2361)
Microprocessor interfacing, memory design, exception handling and interrupts, parallel and 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)
Systems for transmission and reception of digital and analog information. Characteristics and design of wired and wireless communication systems. Baseband, digital, and carrier-based techniques. Modulation. Coding. Electronic noise and its effects on design and performance of communication systems.

EE 4505. Communications Systems Laboratory. (1 cr; QP-5202, 5203; SP-4501 or ¶4501)
Experiments in analysis and design of wired and 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.

EE 4701. Electric Drives. (4 cr; QP-3011, 3062, 3111; SP-3015, 3115, 3601)
AC and DC electric-machine drives for speed and position control. Integrated discussion of electric machines, power electronics, and control systems; hardware lab, 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. (4 cr; QP-3011, 3111, 3062; SP-3015, 3115, 3601)
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). Integral lab.

EE 4951. 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. (1 cr; QP-ECE co-op, 3476; SP-ECE co-op, 3961)
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; SP-EE co-op, 4961)
Industrial work assignment in ECE co-op program. Grade based on student's 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 4981. Senior Honors Project I. (2 cr; QP-Δ; SP-Δ)
Design project for students in ECE honors program.

EE 4982. Senior Honors Project II. (2 cr; QP-Δ; SP-4981)
Design project for students in ECE honors program.

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 student; SP-IT sr or grad student)
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 student, Math 5242, Math 5243 or #; SP-IT grad student, 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 student, Math 5243 or #; Math 5243 or #; SP-IT grad student, 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. Logic Level CAD. (3 cr; QP-5358; SP-4301)
Theory and practice of synthesis, simulation, and test generation algorithms in digital design.

EE 5323. VLSI Design I. (3 cr; QP-3351, 3062 or #; SP-2301, 3115 or #)
Combinational and sequential static CMOS circuits; transmission gate networks; clocking strategies and sequential circuits; CMOS process flows, design rules, structured layout techniques; dynamic CMOS, domino, DCVS; CMOS arithmetic logic units, high-speed carry chains, fast CMOS multipliers.

EE 5324. VLSI Design II. (3 cr; QP-5571 or #; SP-5323 or #)
Performance analysis and design optimization, including parasitic effects and device sizing techniques; design of high-speed parallel shifters; CMOS memory cells, array structures and read/write circuits; self-timed circuit design; 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 quarter.

EE 5329. VLSI Digital Signal Processing Systems. (3 cr; QP-5572 or #; SP-5323 or #; 5323 or #)
Programmable architectures for signal and media processing; data-flow representation; architecture transformations; low-power design, architectures for two's complement and redundant representation, carry-save, and canonic signed digit; scheduling and allocation for high-level synthesis.

EE 5333. Analog Integrated Circuit Design. (3 cr; QP-3062, grad student or #; SP-3115, grad student or #)
Analog integrated circuit design; fundamental circuits for analog signal processing; design issues associated MOS and BJT devices; design and testing of circuits; selected topics (e.g., modeling of basic IC components, design of operational amplifier, comparator, or analog sampled-data circuit filter).

EE 5361. Computer Architecture and Machine Organization. (3 cr; QP-3351, 3352; SP-2301, 2361; SCSi 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 student in IT major or #; SP-4501, 3025, sr or grad student 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 5531. Probability and Stochastic Processes. (3 cr; QP-3021, grad student in IT major or #; SP-3025, grad student 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 and adaptive discrete-time FIR and IIR filters; Wiener, Kalman and Least-Squares; linear prediction and lattice structure; LMS, RLS and Levinson-Durbin algorithms; channel equalization, system identification, biomedical, sensor array processing, spectrum estimation, and noise cancellation applications.

EE 5545. Real-Time Digital Signal Processing Laboratory. (2 cr; QP-3352, 5511, EE sr or grad student in IT major or #; SP-4541)
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 student in IT major or #; SP-4541, 5531, grad student 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 student or #; SP-IT sr or grad student 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 and Microwave Engineering. (3 cr; QP-Sr or grad student in IT major, 3111; SP-IT sr or grad student, 3601)
Fundamentals of RF Microwave engineering, including circuits and antennas. Introduction to RF Microwave waveguides, including planar guides, microwave circuit analysis, and synthesis using passive elements; fundamentals of antennas, dipole antennas, arrays, wire and aperture antennas.

EE 5602. RF and Microwave Analog Circuit Chip Design. (3 cr; QP-3111, 5604; SP-3601, 5601)
Fundamentals of RF/Microwave circuit design; chip design methodology, including topology, analysis, layout, and testing.

EE 5611. Plasma-Aided Manufacturing. (4 cr; QP-Upper div IT or grad student, ME 3301, ME 3303; SP-Upper div IT or grad student, ME 3321, ME 3322 or equiv; SME 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 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 transmissions systems. Direct detection and coherent detection. Optical amplifiers. Optical soliton propagation.

EE 5629. Optical System Design. (2 cr; QP-IT sr or grad student; SP-IT sr or grad student)
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 5653. Physical Principles of Magnetic Materials. (3 cr; QP-IT grad student or #; SP-IT grad student 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. Physical Principles of Magnetic Recording. (4 cr; QP-IT grad student or #; SP-IT grad student or #)
Review of magnetics; analytical models magnetic heads; models of longitudinal and perpendicular magnetic recording and reproduction; magnetic heads, noise properties recording performance, high-speed switching and high frequency impedance; digital recording systems. Lab and demonstration experiments.

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 and applications. Lab and 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. (4 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 and ac converters; practical considerations; very low voltage output converters. Integrated hardware laboratory and 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 and muscle stimulation, EKG and 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 student; SP-IT sr or life science sr or grad student)

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)

University College

EHS 3113. First Responder for Athletic Coaches and Trainers. (3 cr; A-F only)

Meets with Kin 3113. How to provide emergency medical care to injured amateur or professional athletes. Lecture and skills format focuses on recognizing injuries and initially stabilizing the injured athlete. Successful completion entitles students to First Responder certification. Course includes AHA CPR training.

EHS 4011. Concepts in Emergency Health Services. (3 cr; SP-Upper div)

Emergency Medical System (EMS) in the United States, emphasizing basic practices generalized across systems. Components for an effective EMS, including historical perspective, medical-legal concerns, medical oversight, accountability and scope of practice, communications and transportation, rural vs. urban issues, and disaster management.

EHS 4021. Emergency Medical System Planning and Fiscal Management. (3 cr; SP-Upper div)

Planning and fiscal and process management of emergency medical systems. Regulatory requirements, EMS delivery models, contract negotiations, budgeting, and scenario planning.

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 folk songs 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, paraphrasing, 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 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, paraphrasing, 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 paraphrasing. 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; 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 how to write business letters in English as well as how to communicate effectively with e-mail and voice mail for business purposes.

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–Non-native speaker of English; see Minnesota English Center for override; SP–Non-native speaker of English; see Minnesota English Center for override; S-N only)

ESL 0711. Grammar Through Writing. (0 cr; QP–Non-native speaker of English; see Minnesota English Center for override; SP–Non-native 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 0721. High Advanced Reading/Composition. (0 cr; QP–Non-native speaker of English; see Minnesota English Center for override; SP–Non-native 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–Non-native speaker of English; see Minnesota English Center for override; SP–Non-native 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–Non-native speaker of English; see Minnesota English Center for override; SP–Non-native 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–Non-native English speaker; see Minnesota English Center for override; SP–Non-native 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–Non-native speaker of English; see Minnesota English Center for override; SP–Non-native 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–Non-native speaker of English; see Minnesota English Center for override; SP–Non-native 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–Non-native speaker of English; see Minnesota English Center for override; SP–Non-native 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 0911. Fundamentals in English as a Second Language. (0 cr; QP–Written permission of department and satisfactory score on EPT, MNBatt or TOEFL; SP–Written permission of department and satisfactory score on EPT, MNBatt or TOEFL; S-N only)

ESL 0912. Fundamentals in English as a Second Language. (0 cr; QP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; SP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; S-N only)

ESL 0931. Developing Fluency in English as a Second Language. (0 cr; QP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; SP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; S-N only)

ESL 0932. Developing Fluency in English as a Second Language. (0 cr; QP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; SP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; S-N only)

ESL 0933. Developing Fluency in English as a Second Language. (0 cr; QP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; SP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; S-N only)

ESL 0971. Advanced Academic Writing. (0 cr; QP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; SP–Written permission from department and satisfactory score on EPT, MNBatt or TOEFL; S-N only)

English: Creative and Professional Writing (EngW)

Department of English Language and Literature
College of Liberal Arts

EngW 1101. 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-1102 or Δ)
For students with experience in writing fiction. Exercises, experiments, assigned readings, and discussion of students' work.

EngW 3103. Advanced Fiction Writing. (4 cr; SP-3102 or Δ)
Advanced workshop for students with considerable experience in writing fiction.

EngW 3104. Intermediate Poetry Writing. (3 cr; SP-1103 or Δ)
For students with experience in writing poetry. Exercises, experiments, assigned readings, and discussion of students' work.

EngW 3105. Advanced Poetry Writing. (4 cr [max 16 cr]; SP-3104 or Δ)
Advanced workshop for students with considerable experience in writing poetry. Gives students an opportunity to explore new poetic possibilities and to read widely in contemporary poetry and poetics.

EngW 3106. Intermediate Literary Nonfiction Writing. (3 cr; SP-1104 or Δ)
For students with experience in writing memoir/creative nonfiction. Exercises, experiments, assigned readings, and discussion of students' work.

EngW 3107. Advanced Nonfiction Writing. (4 cr; SP-3106 or Δ)
Advanced workshop for students with considerable experience in writing literary nonfiction.

EngW 3110. Topics in Creative Writing. (3 cr [max 9 cr]; SP-1101 or 1102 or 1103 or 1104 or Δ)
Special topics for students with experience in creative writing. See *Class Schedule* for topics.

EngW 3960. Writing Workshop for Majors. (3 cr; SP-Engl major, 6 cr of EngW, jr or sr, major adviser permission, Δ)
Writing workshop for English majors, usually taken during the senior year. Topics specified in the *Class Schedule*.

EngW 5102. Advanced Fiction Writing. (4 cr; SP-Δ)
Advanced workshop for graduate students with considerable experience in writing fiction.

EngW 5103. Advanced Fiction Writing. (4 cr; SP-Δ)
Advanced workshop for students with considerable experience in writing fiction.

EngW 5104. Advanced Poetry Writing. (4 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; 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; SP-Δ)
Advanced workshop for graduate students with considerable experience in writing literary nonfiction.

EngW 5107. Advanced Nonfiction Writing. (4 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. See *Class Schedule* for topics.

EngW 5120. Topics in Advanced Poetry. (4 cr [max 16 cr]; SP-Δ)
Special topics in poetry writing. See *Class Schedule* for topics.

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 5204. Playwriting. (4 cr [max 16 cr]; SP-Δ)
Advanced workshop for students with experience in creative writing and an interest in writing for stage. Contact creative writing program for specific descriptions.

EngW 5205. Screenwriting. (4 cr; SP-Δ)
Advanced workshop for students with experience in creative writing and an interest in writing for the screen. Contact creative writing program for specific descriptions.

EngW 5210. Topics in Advanced Literary Nonfiction. (4 cr [max 16 cr]; SP-Δ)
Special topics in essay writing, such as arts reviewing, writing about public affairs, and writing in personal voice. See *Class Schedule* for particular topics.

EngW 5310. Reading as Writers. (3 cr [max 12 cr])
Special topics in reading fiction, literary nonfiction and poetry. See *Class Schedule* for details.

EngW 5401. Introduction to Editing for Publication. (3 cr)
Beginning editing, from the nature of the editor-writer relationship to manuscript reading, author querying, rewriting, and style. Some discussion of copyediting. Students develop editing skills by working on varied writing samples.

EngW 5402. Advanced Editing. (3 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 5993. Directed Study in Writing. (1-3 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 1001. Introduction to Literature: Poetry, Drama, Narrative. (3-4 cr; SP-Honors regis (all colleges) or Δ for honors sections)
Basic techniques for analyzing and understanding literature. Readings of novels, short stories, poems and plays.

EngL 1181. Introduction to Shakespeare. (3-4 cr; SP-Honors regis (all colleges) or Δ for honors sections)
Lecture survey of Shakespeare's work, treating approximately 10 plays. For students in all colleges of the University.

EngL 1201. Introduction to American Literature. (3 cr; SP-Honors regis (all colleges) or Δ for honors sections)
Discussion and writing about a chronologically or thematically based series of readings from American literature. General approaches to literary analysis and criticism including the social and historical contexts of authorship and reading, and the nature of literary artistry and conventions.

EngL 1301. Introduction to Multicultural American Literature. (3-4 cr; QP-Honors regis or Δ; SP-Honors regis (all colleges) or Δ for honors sections)
Readings include representative works by African American, American Indian, Asian American, and Chicano/Chicana writers, chiefly from the 20th century. Study the social and cultural factors informing America's complex literary past and present.

EngL 1401. Introduction to World Literatures in English. (3-4 cr; QP-Honors regis or Δ; SP-Honors regis [all colleges] or Δ for honors sections)
Introduction to vital, 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 3001. Textual Interpretation, Analysis, and Investigation. (3-4 cr; QP-Engl major or minor or premajor; for honors prereq honors regis or Δ; SP-Engl major or minor or premajor; for honors: honors regis, Engl major or minor or Δ)
Training and practice in the analysis of various literary forms, with emphasis on 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-Engl major or minor, 12 cr in other literature courses, or honors and CLA for honors sections)
Problems of interpretation and criticism. Questions of meaning, form, authority, literary history, social significance.

EngL 3003. 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 3004. 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 3005. 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 3006. 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. (3-4 cr; QP-Engl major or pre-major or #; for honors course - honors status [all colleges]; SP-Engl major or pre-major or #; for honors course - honors status [CLA])

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. (3-4 cr [max 9 cr]; QP-For honors - honors regis or Δ; SP-For honors - honors regis, CLA or Δ)

A special topics course that examines issues related to the reading and understanding of poetry in a variety of interpretive contexts.

Engl 3020. Studies in Narrative. (3-4 cr [max 9 cr]; QP-For honors - honors regis or Δ; SP-For honors - honors regis, CLA 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 *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 *Class Schedule*.

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*.

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]; SP-For honors - honors regis, CLA or Δ)

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 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 3882. Senior Paper. (1 cr; SP-English major, Δ; for honors section: English major, honors, Δ)

English majors register for 1 credit while writing the required senior paper.

Engl 3883. Honors Thesis. (1 or 3 cr; SP-Honors candidacy in English, consent of English honors adviser)

Honors *cum laude* and *magna cum laude* English majors register for at least 1 credit. Honors *summa cum laude* English majors register for 3 credits.

Engl 3960. Junior-Senior Seminar. (3 cr; SP-English major, jr or sr, completion of university writing requirement, Δ at least 2 sem before graduation)

Intensive study of a 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 3993. Directed Study. (1-3 cr; SP-#, Δ, □; for honors: CLA honors regis, #, Δ, □)

Guided individual reading or study.

Engl 5001. Introduction to Methods in Literary Studies. (3 cr; SP-Grad student or #)

Ends and 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 student or #)

Approaches to practical and theoretical problems of literary history and genre.

Engl 5120. Reading Course in American Literature. (3 cr [max 9 cr]; SP-Grad student or #)

For graduate students who seek a general background or preparation for advanced study. Readings typically cover a wide historical range (e.g., the 19th century, a genre such as the novel, or a major literary movement such as Modernism).

Engl 5130. Readings in American Minority Literature. (3 cr [max 9 cr]; SP-Grad student or #)

Contextual readings of 19th- and 20th-century American Minority writers. Topics specified in *Class Schedule*.

Engl 5140. Post-Colonial Literatures. (3 cr [max 9 cr]; SP-Grad student 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 student or #)

Major works of classical criticism the English critical tradition from the Renaissance to 1920. Leading theories of criticism from 1920 to the 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 the literature of the time period designed to prepare graduate students for work in other graduate courses or seminars. Attention to relevant scholarship or criticism. Topics specified in *Class Schedule*.

EngL 5230. Early Modern Literature and Culture.

(3 cr [max 9 cr]; SP–Grad student or #)
 Topical readings in early modern poetry, prose, fiction, and drama designed to prepare graduate students for work in other courses or seminars. Attention to relevant scholarship or criticism.

EngL 5250. 19th-Century Literature and Culture.

(3 cr [max 9 cr]; SP–Grad student or #)
 Readings cover topics in 19th-century British, American, and post-Colonial literatures. May include British Romantic or Victorian literatures; or 19th-century American literature; or a few important writers from a particular literary school, or one genre such as the novel.

EngL 5270. 20th-Century Literature and Culture.

(3 cr [max 9 cr]; SP–Grad student or #)
 Readings cover 20th-century British, Irish, or American literatures, or topics involving the literatures of two nations. May focus on a few important writers from a particular literary school, or may focus on one genre such as drama. Topics specified in *Class Schedule*.

EngL 5291. Contemporary Literature and Culture.

(3 cr; SP–Grad student or #)
 Wide, multi-genre reading in contemporary American, British, and Anglophone literature; designed to prepare graduate students for work in other courses or seminars. Attention to relevant scholarship or criticism. Topics specified in *Class Schedule*.

EngL 5330. Topics in Drama.

(3 cr [max 9 cr]; SP–Grad student or #)
 Wide reading in the literature of a given period or subject designed to prepare graduate students for work in other courses or seminars. Attention to relevant scholarship or 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 and legends), foodways and games. Manner in which folklore is transmitted and changed with concentration on how folklore functions in literature, the mass media, and everyday life.

EngL 5582. Folklore II.

(3 cr; SP–5581, grad or #)
 Training in collection of folklore materials.

EngL 5800. Practicum in the Teaching of English.

(1-3 cr [max 9 cr]; SP–Grad student or #)
 Discussion of and practice in recitation, lecture, small-groups, tutoring, individual conferences, and evaluation of writing and reading. Emphasis on the theory informing effective course design and teaching for different disciplinary goals. Topics (e.g., teaching of literature, or expository or creative writing) specified in *Class Schedule*.

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–Placement in category 2 or 3; some sections may be limited to ESL students; A-F only)
 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 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; A-F only)
 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 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; A-F only)
 Writing on topics concerning the environment. 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 1014. University Writing and Critical Reading, Emphasis on Citizenship and Public Ethics.

(4 cr; SP–Placement in category 2 or 3; some sections may be limited to ESL students; A-F only)
 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 1021. Intermediate Expository Writing.

(4 cr; SP–1011 or 1012 or 1013 or 1014; A-F only)
 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 1601. English Language and Society.

(3 cr)
 Provides a general, nontechnical understanding of the systematic, dynamic and creative nature of human language, with special application to the English language.

EngC 3027. Advanced Expository Writing.

(4 cr; SP–1011 or 1012 or 1013 or 1014, jr)
 Improve communication skills by incorporating narrative, descriptive, analytical, and persuasive techniques into writing on general topics. Effective argumentation through critical reading, use of library resources, and awareness of context and audience.

EngC 3601. 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 3602. 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 3603. Varieties of World English.

(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). The development of local standards and vernaculars. Sociolinguistic methods of analysis.

EngC 3604. Public Discourse.

(3 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 3605. Social Variation in American English.

(3 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 U.S. 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 3621. 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 5602. Gender and the English Language.

(3 cr; SP–Grad student or #)
 An introduction to the features of English that are gender-marked or gender-biased; the connections between language theory and social structures, including class and ethnicity; patterns of women’s and 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). The development of local standards and vernaculars. Sociolinguistic methods of analysis.

EngC 5605. Social Variation in American English.

(3 cr; SP–Grad student or #)
 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 5611. History of the English Language. (3 cr; SP–Grad student or #)

The history of the English language including its development 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 #)

Introductory study of the language to A.D. 1150. Selected readings in prose and poetry. Some attention to the culture of the Anglo-Saxons.

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 student or #; SP–Grad student or #)

Grammatical structures of modern Irish dialect of Connemara, Co. Galway; development of skills in both oral and written language; vocabulary, manipulation of grammatical structures, speaking, listening, reading, and writing practice; modern Gaelic culture.

EngC 5622. Irish Language II. (4 cr; SP–EngC 5621, #)

Grammatical structures of modern Irish dialect; development of skills in both oral and written language; vocabulary; manipulation of grammatical structures; speaking, listening, reading, and writing practice; modern Gaelic culture.

EngC 5630. Theories of Writing and Instruction. (3 cr; SP–Grad student or #)

Introduction to the major theories that inform the 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 #)

Survey, compare, and contrast the assumptions of classical and contemporary rhetorical theory, especially as they influence the field of composition studies. Rhetoric is one of the chief contributors to the interdisciplinary field of composition.

EngC 5632. Electronic Text. (3 cr; SP–\$3632; grad student or #)

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 5640. Research Methods in Rhetoric, Composition, and Language. (3 cr; SP–Grad student or #)

The various research paradigms, methodologies, and procedures used in the field (ethnographic, case-study, historical, critical, quantitative, text-analytical, survey-based, etc.). Emphasis on reading and analyzing existing research studies, and on preparing original research. Topics specified in *Class Schedule*.

EngC 5641. Editing for Publication. (4 cr; SP–\$3641)

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 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; A-F only)

Lecture and lab study of principal orders of insects and arachnids; introduction to structure, physiology, population dynamics, and management. Course module meets in weeks 1-4 of semester.

Ent 3005. Insect Biology. (2 cr; QP–1005; SP–\$3001 or #; A-F only)

Lecture and lab study of biodiversity and natural history of insects; insect behaviors, functional roles in natural and managed environments, and effects of insects on human history. Required overnight field trip, see instructor for details. Course module meets in weeks 5-15 of semester.

Ent 4005. Field Crop Entomology. (2 cr; QP–3005; SP–\$3001 or #; A-F only)

Lecture and lab study of management of insect populations; lip histories, habits and recognition of insect pests of field and vegetable crops. Fifty specimen insect collection required. Course module meets in weeks 5-15 of semester.

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. (3 cr; QP–\$14021 recommended, Biol 1009 or #; SP–\$14021 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 4251. Forest and Shade Tree Entomology. (2 cr; QP–1005, 3005 SP–\$3001 or #; A-F only)

Lecture and lab study of ecology and population management of forest and shade tree insects with emphasis on predisposing factors and integrated management. Required overnight field trip, see instructor for details. Course module meets in weeks 5-15 of semester

Ent 4281. Livestock Entomology. (2 cr; QP–1005, 3005; SP–\$3001 or #; A-F only)

Lecture and lab study of biology and management of insects, mites, and ticks that affect livestock, poultry, and companion animals. Emphasis on problem identification and problem solving. Course module meets in weeks 5-15 of semester.

Ent 5011. Insect Structure and Function. (4 cr; QP–3005 or #; SP–3005 or #; A-F only)

Comparative study of insect structures and their functions with an evolutionary perspective; includes introductory physiology of digestion, respiration, and 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, 1 BioC course or #; SP–5011, 1 BioC 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 #; SP–Biol 5041 or EBB 5122 or #)

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. Offered fall 1998 and alternate years.

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 #; SP–3005 or #)

Biology of arthropod vectors of human disease. Emphasis on disease transmission and host, vector, and pathogen interactions. Offered 1998 and alternate years.

Ent 5311. Sampling Biological Populations. (3 cr; QP–Stat 5021 or equiv; SP–Stat 5021 or equiv)

Sampling plans for study of field and laboratory populations. Statistical distributions and techniques for detecting and coping with aggregation. Randomization, required sample size, and optimal allocation for common probability designs. Sequential plans for making decisions.

Ent 5321. Ecology of Agriculture. (3 cr; QP–Agro or Hort or AnSc course, Ent or PIPa or Soil course or #; SP–Agro or Hort or AnSc course, Ent or PIPa or Soil course or #; A-F only)

Ecological perspective on post-industrial agriculture; origins of agriculture, social functions, and ecology of contemporary and extinct agricultural systems. Soils, plant development, pest ecology, forage quality, animal production, and food quality as an interactive network of factors.

Ent 5341. Biological Control of Insects and Weeds. (3-4 cr; QP–Biol 1009, EEB 3001 grad student or #; SP–3001, Biol 1009, EEB 3001 or grad student; 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–5031)

The 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 with 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-#; 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, use and value of museums, etc. Offered 1998 and alternate years.

Ent 5381. Lepidopterozoology. (2-3 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. (2-3 cr; SP-\$NSC 5481)
Fundamental principles and concepts underlying cellular bases of behavior and "systems" neuroscience. Particular invertebrate preparations discussed.

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 are 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. Content varies by offering.

FE 5201. Family and Work Relationships. (3 cr; SP-\$WCPE 5201; 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*

The following courses are part of the department's Alcohol and Drug Counseling Education Certificate: 3426/5426, 3427/5427, 3428/5428, 3429/5429, 3431/5431, 3432/5432, 3433/5433, 3434/5434, 3435/5435, 3436/5436, 3437/5437, 3450/5450.

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; SP-FSoS major; A-F only)
Systematic preparation for upper division education, research and 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 and/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 #)
Applies family systems and other family theories to the dynamics and processes relevant to family life. Diversity issues related to gender, ethnicity, sexual orientation, and disability are integrated into the course. Divorce, single parenthood, and remarriage are covered as well as family strengths and family problems.

FSoS 3103. Family Resource Management. (3 cr; SP-Soph or #)
Analysis of the managerial behavior of individuals and families. Emphasis on how individuals and families make decisions and solve problems through the use of interpersonal, economic, natural, and community resources to achieve central life purposes.

FSoS 3150. Special Topics in Family Social Science. (2-4 cr [max 4 cr]; SP-Depends on topic, soph)
Review of research and scholarly thought. See *Class Schedule* for topics.

FSoS 3191. Independent Study in Family Social Science. (1-5 cr [max 12 cr]; SP-Jr, #)
Independent reading and/or research under faculty supervision.

FSoS 3426/5426. Alcohol and Drugs: Families and Culture. (3 cr)
Psychology and sociology of drug use and abuse. Topics include life-span, epidemiological, familial, and cultural data regarding use; fundamentals of licit and illicit drug use behavior; variables of gender, ethnicity, social class, sexuality, sexual orientation, and disability.

FSoS 3427/5427. Alcohol, Drugs, and the Brain. (1 cr)
The psychopharmacology of alcohol and drug use. Topics include licit and illicit drugs; mechanisms of drug action in the brain; alcohol and drug taking practices, and the influence of alcohol and drugs on behavior.

FSoS 3428/5428. Assessment and Treatment of Alcohol and Drug Use Issues. (3 cr)
Assessment and treatment of alcohol and other drug use problems. Theoretical and practical approaches to diagnosis, screening, and treatment; issues of loss, trauma, family, and culture; diversity issues of gender, ethnicity, social class, sexuality, and disability.

FSoS 3429/5429. Counseling Skills Practicum I. (3 cr)
Develop competency in basic counseling skills. Topics include counselor needs/motivations, nonverbal communication, basic and advanced empathy, identifying strengths, maintaining focus, challenging discrepancies, use of self. Emphasis on building from client strengths and learning through role-playing.

FSoS 3431/5431. Counseling Skills Practicum II. (3 cr; QP-3029, 3030 or #; SP-3429)
Exposure to advanced therapeutic methods and understanding the processes of change. Identifying and reinforcing or challenging core beliefs; reframing; paradox; trance and guided imagery; cognitive-behavioral, solution-focused, and narrative therapies. Non-pathologizing models of therapy emphasized.

FSoS 3432/5432. Chemical Abuse and Families: An Overview. (3 cr)
Relationships and family systems with attention to families in which alcohol or drug use is a problem. Topics include family types, family of origin, models of family therapy, family systems theory, and alcoholism. Review of literature.

FSoS 3433/5433. Group Therapy: Theory and Practice. (3 cr)
Lecture and small group experience designed to introduce group therapy concepts. Stages of group development, affective development, group communication; education, support, and therapy groups, leadership roles and functions, critical incidents, therapeutic factors, and group processes.

FSoS 3434/5434. Gambling in America. (3 cr)
Introduction to risk-taking, gambling, and development of gambling problems. Sociological, historical, economic, and public policy perspectives. Family influences, gambling among youth and aging adults, and frameworks for assessing and treating problematic gambling.

FSoS 3435/5435. Internship in Alcohol and Other Drug Use Problems. (2-18 cr [max 18 cr]; QP-Admission to ADCEP certificate program, #; SP-Admission to ADCEP certificate program, #; S-N only)
An 880-hour rotating clinical internship designed to strengthen student competencies. Students are placed in 3 to 4 different community agencies/treatment centers. A separate registration is required for each placement.

FSoS 3436/5436. Ethical Issues in Addiction Counseling. (1 cr; QP-Admission to ADCEP certificate program, #; SP-Admission to ADCEP certificate program, #)
Exploration/discussion of ethical issues and challenges in alcohol and drug counseling and therapy. Decision-making; values conflicts; boundary violations; client rights; professional responsibilities; issues in relationship/family therapy, group work, cross-cultural counseling; issues working with special populations.

FSoS 3437/5437. Supervision Group. (2 cr [max 6 cr]; QP-Admission to ADCEP certificate program, #; SP-Admission to ADCEP certificate program, #)
Supervision of alcohol and drug use counseling in group format. Each student presents at least one tape of a client counseling session. Role-playing and extensive discussion of clinical issues. Focus on non-pathologizing models of therapy. Some training tapes viewed, selected readings.

FSoS 3450/5450. Special Topics: Addiction. (1-4 cr [max 9 cr])
Selected readings and/or projects in alcohol and drug use and problems. Evaluation of students' mastery of the assigned study.

FSoS 4101. Sexuality and Gender in Families and Close Relationships. (3 cr; QP-90 cr or grad student in social, behavioral, educational, health science, or human service program or #; SP-3102, 3103 or #)
Human ecology and human development as frameworks for examining sexuality in the context of close relationships. Diversity of sexual beliefs, attitudes, and behaviors within differing social contexts are examined. Emphasizes scientific knowledge for the promotion of sexual health among individuals, couples, and families through various stages of life.

FSoS 4102. Global and Diverse Families. (3 cr; QP-3600; SP-3102, 3103 or #)
Multiple perspectives on family dynamics of various racial and ethnic populations in the United States and other countries in the context of national and 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 4104. Family Psychology. (3 cr; QP-3600; SP-3102, 3103 or #)
Processes that take place in families of origin, families of choice, and other close relationships within diverse social contexts. Emphasis on evaluating current research on family dynamics within and across generations.

FSoS 4105. Methods in Family Research. (3 cr; QP-3260; SP-3102, 3103, intro statistics course or #)
Examines the scientific method, major questions and objectives of family research, data gathering, analysis, reporting, and social context of family research.

FSoS 4150. Special Topics in Family Social Science. (2-4 cr [max 4 cr]; SP-Jr, depends on topic)
Review of research and scholarly thought. See *Class Schedule* for topics.

FSoS 4152. Gay, Lesbian, and Bisexual People in Families. (2 cr; SP-3102, 3103 or #)
Multiple perspectives of gay, lesbian, and bisexuals in families and their unique contributions to understanding diversity among families. Topics include homophobia, mythologies, coming-out, identity, gender, social networks, intimacy, sexuality, children, parenting, aging, AIDS, and ethnicity.

FSoS 4153. Family Financial Counseling. (2 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 4154. 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. (2 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 and/or research under faculty supervision.

FSoS 4294. Research Internship. (1-4 cr [max 4 cr]; SP-FSoS major, #)
FSoS majors work with faculty on research projects that may include research planning, proposal writing, literature review, data collection, data coding and/or cleaning, data analyses, and research 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 the student's interest of study.

FSoS 5101. Family Systems. (3 cr; SP-§3102; grad student or #)
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 related field grad student, #)

Finance (Fina)

Department of Finance
Curtis L. Carlson School of Management

Fina 3001. Finance Fundamentals. (2 cr; QP-Acct 1050; SP-Acct 2050; A-F only)
Comprehensive introduction to financial management principles. Survey of money and capital markets, the risk/return/valuation triad, capital budgeting basics, capital structure and financial leverage, cost of capital, financial performance measures, dividend policy, working capital management, and some basics of international financial management and derivatives.

Fina 4121. Financial Markets and Interest Rates. (2 cr; QP-BFin 3000; SP-3001; A-F only)
Money and bond markets and the determination of interest rates; Federal Reserve operations; theories of the term structure of interest rates, duration and convexity; topics in bond portfolio management.

Fina 4122. Banking Institutions. (2 cr; QP-BFin 3200; SP-4121; A-F only)
The management of banking institutions including commercial banks and thrifts. Theory and practice in banking. Specific topics include asset management, liability management, and capital management. Some public policy issues in banking also considered.

Fina 4241. Corporate Financing Decisions. (4 cr; QP-BFin 3000, BFin 3100; SP-3001; A-F only)
Develops theoretical and applied understanding of financial decisions. Includes the impact of financing on real asset valuation, debt maturity choice, dividend policy, bankruptcy costs and debt holder-equity holder conflict, capital structure and corporate strategy, effect of financing decisions on managerial incentives, information conveyed by financial decisions, and primary equity markets.

Fina 4242. Corporate Investment Decisions. (4 cr; QP-BFin 3000, BFin 3100; SP-3001; A-F only)
Focuses on efficiently managing working capital and fixed assets. Topics include managing cash, receivables, and inventories; evaluating short-term financing; making capital budgeting decisions; assessing mergers and acquisitions; and reviewing and targeting performance.

Fina 4321. Portfolio Management and Performance Evaluation. (2 cr; QP-BFin 3000; SP-3001; A-F only)
Introduces the investment environment and the concepts used to manage security portfolios. Topics include an introduction to portfolio and security risk and return tradeoffs, portfolio diversification, asset allocation, active portfolio management versus indexed portfolios, and portfolio performance evaluation.

Fin 4322. Security Analysis. (2 cr; QP-BFin 3000; SP-3001; A-F only)
Valuation of equity securities with focus on basic valuation principles. Attention is given to the relationship between the various valuation approaches. Develops and applies tools for the student to test self-designed security selection rules.

Fin 4541. Futures, Options, and Other Derivative Securities. (4 cr; QP-BFin 3300; SP-3001; A-F only)
Exposes students to some of the most sophisticated financial instruments available. Background in the foundations of stochastic cash flow representations, the construction portfolios of futures and options to meet investment objectives, the basic methods for valuing real and financial futures, swaps, and options.

Fin 4641. International Finance and Risk Management. (4 cr; QP-BFin 3000; SP-3001; A-F only)
Introduction to the international dimensions of corporate financing, investment, and risk management decisions. Primary topics include foreign exchange markets, international financial systems, foreign exchange rate determination, measuring and managing currency risk, multinational capital budgeting, cost of capital in emerging economies, risk management and corporate financing decisions.

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 student)
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 student)
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 student)
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 student)
Meets concurrently 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)
The ecology and management of fish and wildlife in areas of intensive agriculture. Conservation and management practices for fish and wildlife on land used for agricultural purposes. Designed specifically for majors in agricultural sciences.

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 4003. Human Dimensions of Wildlife Management. (3 cr; QP-Biol 1201 or Biol 1009, Biol 3008; SP-Biol 1001 or Biol 1009, Biol 3407)
History, sociology, economics, and politics of managing wildlife.

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. (1 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 4200. Honors Seminar. (1 cr; QP-Admission to FW honors program; SP-Admission to FW upper div honors program)
Lectures and discussions on current topics presented by faculty and students.

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 4401. 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; QP-FW sr or grad student or #; SP-FW sr or grad student or #)
Experience in problem solving, management problem identification and analysis design, information and data gathering analysis, and oral and written problem reporting. Contemporary fisheries and wildlife management issues selected for topics.

FW 4801. Honors Research. (2 cr; QP-Admission to FW honors program; SP-Admission to FW upper div honors program; A-F only)
First semester of an independent research project supervised by a faculty member.

FW 4802. Honors Research. (2 cr; QP-Admission to FW honors program; SP-Admission to FW upper div honors program; A-F only)
Continuation of 4801. Students complete honors thesis and present an oral report.

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 student or #; SP-EEB 4134 or grad student 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)
Introduction to theory and methods for estimating vital statistics of fish populations. Use microcomputers and statistical software to describe, analyze, and model attributes of fish populations in case studies drawn from the literature of marine and freshwater fisheries management.

FW 5603. 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.

FW 5604. 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)
Field course using live animals to provide practical techniques to maximize human and animal safety and encourage effective operations. Preparation procedures, legal responsibilities, capture drugs and delivery systems, safety measures, ethical issues, professional skills and basic veterinary procedures for handling wildlife.

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 lifesaving 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)
Fundamental concepts of nutrition, nutrient functions, human nutritional requirements, food sources, evaluating nutrition information, food safety, role of nutrition in chronic diseases, nutrition policy, nutrition 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 the composition and the chemical and physical properties of foods; interaction, reaction, and evaluation of foods due to formulation, processing and preparation.

FScN 3612. Life Cycle Nutrition. (3 cr; QP-1612, Chem 1052; SP-1112, Chem 1022)
Understand nutritional changes throughout the life cycle including pregnancy, lactation, childhood, adulthood, and aging. Discuss topics relevant to life cycle changes including body composition, immunity, and sports nutrition.

FScN 3614. Nutrition Education. (2 cr; QP-1612; SP-1112)
Application of theories and principles of learning, behavior change, and instructional methods to nutrition education.

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, #)
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, 3732 or ¶3732)
Experience in the management of a food service operation. On- and off-campus commercial and institutional restaurants used as laboratories. Field trips required.

FScN 3732. Food Service Operations Management. (3 cr; QP-3102; SP-3102 or ¶3102)
Knowledge and skills of planning, preparation, delivery, service, and management of 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, #)
Supervised food service production and management experience in a community or health care facility.

FScN 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; QP-FScN undergrad, #; UC only; SP-FScN undergrad, #; UC only; S-N only)
Supervised practical and professional experience in food industry firms or government agencies; evaluative reports and consultations with faculty advisers 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 student; SP-\$Agro 4103, \$ApEc 4103, \$CAPS 4103; jr or sr or grad student)
A multi-disciplinary 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)
Microbiological methods for analysis of foods and the use of microorganisms for the 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 4312. 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. Principles of Food Engineering. (4 cr; QP-3136, Math 1252, Phys 1042; SP-3102, Math 1272, Phys 1102 or Phys 1302)
Specific applications of engineering principles (e.g., heat and mass transfer, kinetics, thermodynamics) to unit operations in food production.

FScN 4332. Food Processing Operations. (3 cr; QP-5135; SP-4331)
Application and integration of engineering principles to unit operations used in food production including equipment design and effects of processing on food quality (chemical and microbiological).

FScN 4341. Sensory Evaluation of Food Quality. (3 cr; QP-3112, 5110, 5120, Stat 3012; SP-4131, Stat 3011)
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 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, #)

Application of nutrition knowledge in the solution of problems related to health promotion. Assigned readings, discussion, and experiences in community agencies.

FScN 4612. Human Nutrition. (3 cr; QP–1612, Chem 1052, Phsl 3051; SP–1112, Chem 1022, Phsl 3051)
Understanding digestion and absorption of nutrients at an advanced level. Research techniques in nutrition including human and epidemiological studies. Health promotion and disease prevention theories.

FScN 4613. Experimental Nutrition. (2 cr; QP–3612, BioC 3021, Stat 3011; SP–3612, BioC 3021, Stat 3011)
Laboratory experience in chemical and 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, Phsl 3051, BioC 3021)
Nutrition assessment and support. Pathology, management, and nutrition therapy for disorders of the gastrointestinal, immune, and respiratory systems, and cancer.

FScN 4666. Medical Nutrition Therapy II. (3 cr; QP–5666; SP–4665)
Pathology, management, and nutrition therapy for disorders of the cardiovascular, endocrine, urinary, and neuromuscular and skeletal systems. Nutrition intervention for inborn errors of metabolism, and eating disorders and obesity.

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 #)
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)
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 #)
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–Admitted to Coordinated Program in Dietetics or #)
Application of nutrition knowledge in the solution of problems related to health and disease; assigned readings, discussions, and experience in medical centers. Emphasis on cardiovascular, endocrine, urinary tract, energy imbalance, and eating disorders.

FScN 4996. Field Experience: Medical Nutrition Therapy III. (2 cr; QP–Admitted to Coordinated Program in Dietetics or #; SP–Admitted to Coordinated Program in Dietetics or #)
Application of nutrition knowledge in the solution of problems related to health and disease; clinical management experience in medical centers. Emphasis on pediatrics, home health care, and 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 5521. Flavor Technology. (2 cr; QP–5110; SP–4111)
Flavor and off-flavor development in foods. Industrial production of food flavorings and their proper application to food systems.

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 5621. Nutrition and Metabolism. (4 cr; QP–3612, BioC 3021, Phsl 3051; SP–3612, BioC 3021, Phsl 3051)
Facilitates understanding of carbohydrate, lipid, and protein metabolism using a “systems” or “holistic” approach to emphasize how metabolic pathways interrelate.

FScN 5622. Vitamin and Mineral Biochemistry. (3 cr; QP–3612, BioC 3021, Phsl 3051; SP–3612, BioC 3021, Phsl 3051)
Nutritional, biochemical, and physiological aspects of vitamins and essential minerals in humans and experimental animal models.

FScN 5623. Regulation of Energy Balance. (2 cr; QP–3612, BioC 3021, Phsl 3051; SP–3612, BioC 3021, Phsl 3051)
Regulation of energy balance in humans including regulation of food intake and energy expenditure.

Forest Resources (FR)

*Department of Forest Resources
College of Natural Resources*

FR 1001. Orientation and Information Systems. (1 cr; A-F only)
Information on curricula offerings, liberal education requirements, careers in forest resources, urban forestry and recreation resource management, and summer jobs and internships. Computers and computer-based tools as they apply to forestry and related coursework. Techniques for information retrieval.

FR 1101. Dendrology. (3 cr)
Identification, nomenclature, classification, and distribution of important forest trees and 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 in 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 and stand measurement, and basic forest sampling techniques. Taught in 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 and function of forests as ecological systems. Characteristics and dynamics of species, populations, communities, landscapes, and ecosystem processes. Includes examples applying ecology to forest management. Special emphasis on fire ecology. One field trip and 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.

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 4200. Honors Seminar. (1 cr; QP–Admission to FR honors program; SP–Admission to FR upper div honors program; A-F only)
Lectures and discussions on current topics presented by faculty and students.

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 4232. 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–3232, RRM major; A-F only)
Development of environmental framework for understanding recreation and leisure behavior; contributions of several disciplines; current cultural trends; management implications for public and private management of recreational and 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 resources course ; SP–Water resources 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. See *Class Schedule* for topics.

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–FR 5100; SP–FR 4411)

Practice in marking for thinning, writing prescriptions for reforestation, and other management practices. Evaluation of site conditions and impact of management on site productivity and wildlife habitat. Oral and written reports, field trips. Offered at Cloquet Forestry Center.

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–4611)

Field application of best management practices, preparation and administration of timber sales, and forest road design. On-site evaluations of timber harvesting systems. Offered at Cloquet Forestry Center.

FR 4801. Honors Research. (2 cr; QP–Admission to FR honors program; SP–Admission to FR upper div honors program; A-F only)

First semester of an independent research project supervised by a faculty member.

FR 4802. Honors Research. (2 cr; QP–Admission to FR honors program; SP–Admission to FR upper div honors program; A-F only)

Students complete honors thesis and present an oral report.

FR 4894. Directed Research. (1-3 cr [max 10 cr]; QP–#; SP–#)

Student selects and conducts a research project on topic of personal interest under guidance of a faculty mentor. The course is documented by an initial proposal and reports of accomplishments.

FR 5104. Forest Ecology. (4 cr; QP–biol course, chem course, grad student or #; SP–§3104; two biol courses, chem course, grad student or #; A-F only)

The form and function of forests as ecological systems. Characteristics and dynamics of species, populations, communities, landscapes, and ecosystem processes. Examples apply ecology to forest management. Emphasis on fire ecology. One field trip and 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 gasses; 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 and community dynamics, mapping forests, tree and stand measurement. Taught in 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 student or #; SP–§3251; sr or grad student 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)

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, reading, 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—Two 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 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-3015)
Intensive work in oral expression and listening comprehension in French, incorporating a 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 3101. 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 and discussion of major forms of the medieval tale (comic, bawdy, moralizing, fantasy, historical) in modern French translation. Exploration of their relationship to the 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 that were characteristic in their time or influential later. Works of all genres are read. The actual works read 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 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 majors)
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 4101. Seminar in French Studies.** (3 cr; SP-Completion of all pre-elective requirements for major or permission of director of undergraduate studies)
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 cr, 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 undergrad)

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 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 5001, grad student, #)

Advanced study of the 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 student)

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)

Basic geometric concepts and introductory logic: logic, measurement, angles, polygons, plane geometric figures, three-dimensional figures, relationships among angles, and constructions. Programmed study: students complete course requirements in time frame established by instructor. (UC only.)

GC 0643. Mathematics: Programmed Study. (0 cr; SP-[4 cr equiv], #; BC; 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. (UC only.)

GC 0712. Introduction to Algebra Part I. (0 cr; QP-0611 or 0615 or equiv; SP-[4 cr equiv], \$0616, \$0721, \$1435; GC math placement; BC; A-F only)

Learning and using behaviors that increase the probability of success in math courses. Properties, concepts, and procedures of arithmetic fractions, percents, unit conversions, and simple geometric figures. Signed numbers, equations, inequalities, and algebraic word problems.

GC 0713. Introduction to Algebra Part II. (0 cr; SP-[4 cr equiv], \$0617, \$0618, \$0721, \$1435; # of 0712 instructor; BC; A-F only)

Continuation of 0712. Learning and using behaviors that increase the probability of success in math courses. Rectangular graphs, exponents, polynomials, factoring, rational expressions, linear modeling, and algebraic work problems. 0712 and 0713 combined cover the content of 0721.

GC 0721. Introductory Algebra. (0 cr; QP-0611 or 0615 or equiv; SP-[4 cr equiv], \$0616, \$0617, \$0621, \$1435; GC math placement; BC; A-F only)

Concepts and procedures of elementary algebra: equations, inequalities, exponents, polynomials, factoring, rational expressions, graphs, word problems. Content roughly equivalent to 9th-grade algebra but pace, difficulty, and level of abstraction geared for college. Preparation for intermediate algebra (GC 0731).

GC 0731. Intermediate Algebra. (0 cr; QP-C or above in 0625 or equiv; SP-[4 cr equiv], \$0618, \$0631, \$1443, \$1444, \$1445, \$1446; C or better in 0721 or GC math placement; BC; A-F only)

Absolute value, systems, linear, quadratic, rational, exponential, and logarithmic functions, radicals, conic sections, sequences, series, Binomial Theorem. Content equivalent to 11th-grade algebra but pace, difficulty, and level of abstraction geared for college. Preparation for precalculus.

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 nonnative 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 nonnative 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 nonnative 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 for Exploration. (1 cr; BC)

Identify educational and career goals: self-assessment, vocational inventories, and workbook activities. Through discussion, students learn about the world of work and their place in it.

GC 1077. Career Planning: Strategies for Developing an Action Plan. (1 cr; BC)

How to turn career goals into action. How transitions and life changes affect career decisions. Strategies for information interviewing, cover letter and resume writing, and job interviewing. Prepare for the world of work through active classroom participation.

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; 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.

GC 1112. Ecological Evaluation of Environmental Problems. (3 cr; 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 1131. Principles of Biological Science. (4 cr; QP-0611 or 0615 or equiv; SP-0711 or equiv or ¶0711; TC)

Biodiversity and classification, genetics, evolution, ecology, life cycles and reproduction, cell theory, and chemical bases for life from a "how-we-know" perspective; relevancy to modern life. Inquiry-based, collaborative lab. (3 lect, 2 lab hrs per wk)

GC 1132. Essentials of Human Anatomy and Physiology. (3 cr; QP-0611 or 0615 or equiv; SP-0711 or equiv; BC)

Organized by organ systems (e.g., urinary, reproductive) the course examines both health and disease. Access to many lecture materials and activities via Internet. (UC or IDL only.)

GC 1133. Nature Study. (3 cr; TC)

Natural history for students with little or no training in biology. Minnesota plants and animals examined in the 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; QP-0621 or equiv; SP-0721 or equiv; BC)

Organized by organ systems (e.g., urinary, reproductive) the course examines both health and disease. Access to many instructional materials and activities via Internet.

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; 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; 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-0721 or equiv; BC)

Principles and concepts that govern matter, energy, and motion. Theoretical understanding builds upon familiar experiences and inquiry processes of observation, analysis, and modeling. Structure and states of matter, potential and kinetic energy, thermodynamics, mechanics, electricity, radiant energy, and sound.

GC 1166. Principles of Chemistry. (3 cr; QP-0621 or equiv; SP-0721 or equiv; BC)

Problem-solving techniques. Classification of matter, elements, atomic and molecular structure, compounds, mole calculations, chemical bonding, empirical formulas, chemical reactions, stoichiometry, bond energy and enthalpy, gases and gas laws, solutions, solution concentrations, acids, bases, qualitative equilibrium.

GC 1171. Physical Geology. (4 cr; 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.

GC 1172. Historical Geology. (4 cr; 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; 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; 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; 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 1231. U.S. Growth of National Power. (4 cr; 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; 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 1235. Law in Society. (4 cr; BC)

How social science concepts and research affect legal responses to social conflict. History and philosophy of American law; interaction of social and legal institutions; effect of beliefs and social conditions on how law addresses family, criminal, employment, and environmental controversies.

GC 1251. World History: Since 1500. (4 cr; 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; 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; 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; 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; 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; 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; 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 1365. Literatures of the United States. (3 cr; BC)

Stories, poetry, essays, and drama by diverse U.S. writers (mid-19th century to present) depicting conflicts and challenges of life in various stratas of American culture. Addresses the multicultural aspect of the "American story."

GC 1366. Images of Women in Literature. (4 cr; 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 1367. Contemporary Literature: International

Perspectives. (4 cr; 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.

GC 1371. Reading Short Stories. (3 cr; 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 1374. The Movies. (3 cr; 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; 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; BC)

Proficiency in the conventions of academic writing, reading, and research skills through expository writing, reading, and discussion. How people communicate in society, perceive events and ideas, and how they think and write about them. Extensive use of computers as tools for writing and 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, and research. Multicultural, thematic content. Extensive experience with computers as tools for writing and 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; QP-0631 or equiv; SP-\$1442; 0731 or equiv or ¶0731; TC)

Formal (symbolic) techniques for evaluating the validity of arguments (Venn diagrams, truth tables, formal proofs). Translate English statements into the symbolic system and develop skills working with abstract, formal tools to understand the structure and complexity of valid reasoning.

GC 1461. Oral Communication in the Public Sphere. (3 cr; 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; 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; 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; 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 I. (3 cr; BC)

Conceptual, technical, and historical aspects of photography as art. Creative process through hands-on experience with camera control, film development, enlarging, and printing in black-and-white photography lab. Individual and group critiques of student portfolios. Additional lab time required. Students must have a camera (35mm with adjustable controls preferred).

<p>BC—Base Curriculum TC—Transition Curriculum CE—Commanding English</p>
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GC 1511. Introduction to Business and Society. (4 cr; 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.

GC 1513. Principles of Small Business Operations. (3 cr; 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; 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; 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; 0721 or intro algebra or equiv; TC)

Hands-on word processing, data manipulation, and data analysis. Word processing—enter, edit, and format text; spreadsheets—enter data, do calculations, and make decisions based on data; database management—manipulate and filter sets of data. No computer experience necessary. Students may use Macs or Windows for homework.

GC 1573. Introduction to Word Processing. (2 cr; QP-0621 or equiv; SP-\$1571; 0721 or equiv)

Hands-on course covering elements of word processing using Microsoft Word. Homework assignments and exam done on computer. Enter, edit, and format text; paragraphs and sections, styles, headers and footers, footnotes, tables; work with files. Students may use Macs or Windows for homework. Covers first half of 1571 content.

GC 1574. Introduction to Spreadsheets. (2 cr; QP-0621 or equiv; SP-\$1571; 0721 or equiv)

Introduction to spreadsheet programs (Excel). Hands-on computer intensive class where students enter, edit, and format text and numbers; use formulas and functions; create IF/THEN/ELSE decision logic; create charts; and filter databases. Homework and exams done on computer. Students may use Macs or Windows for homework. Covers second half of 1571 content.

GC 1575. Introduction to Computers and the Internet. (4 cr; QP-0621 or equiv; SP-0721 or intro algebra or equiv; BC)

Hands-on computer literacy covering the latest developments in hardware (microprocessor, memory, storage), software (operating systems and

applications), the Internet (World Wide Web, e-mail, Telnet, FTP), and multimedia capabilities. No computer experience necessary.

GC 1721. Marriage, Family, and Personal Fulfillment. (4 cr; 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; 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; 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; BC)

Historical and contemporary prose, poetry, and drama analyzed to assess artists' interpretations of their identity. Issues of generational conflict and peer pressure, "fitting in," and preserving heritage. Resources in culture-rich community and multimedia presentations.

GC 1851. Multicultural Relations. (3 cr; 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; 24 sem cr or fewer)

Reading, discussion, critical analysis, and writing about environmental issues. Intensive, small group setting designed for first-year students.

GC 1902. Freshman Seminar: Cultural Diversity. (3 cr; SP-\$1901, \$1903, \$1904; 24 sem cr or fewer)

Reading, discussion, critical analysis, and writing about cultural diversity topics. Intensive, small group setting designed for first-year students.

GC 1903. Freshman Seminar: Citizenship and Public Ethics. (3 cr; SP-\$1901, \$1902, \$1904; 24 sem cr or fewer)

Reading, discussion, critical analysis, and writing about citizenship and public ethics topics. Intensive, small group setting designed for first-year students.

GC 1904. Freshman Seminar: International Perspectives. (3 cr; SP-\$1901, \$1902, \$1903; 24 sem cr or fewer)

Reading, discussion, critical analysis, and writing about international perspectives topics. Intensive, small group setting designed for first-year students.

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 2283. The Psychology of Human Development. (4 cr; QP-1281 or Psy 1001; SP-1281 or Psy 1001, 1421 or EngC 1011; TC)

Biosocial, cognitive, and psychosocial development of individuals over the life span. Writing intensive and includes computer assisted instruction, video, and small group discussion.

GC 2357. World Religious Beliefs. (4 cr; QP–30 cr, 1422 or equiv; SP–20 cr, 1421 or equiv; TC)
Explores beliefs, rituals, and attitudes of the world’s major living religions and many parallel “little traditions” in their historical, social, and cultural settings. Intensive writing and reading component.

GC 2375. Film and Society. (4 cr; QP–24 cr, 1422 or equiv; SP–15 cr, 1421 or equiv; TC)
Films as medium for social and cultural expression. Problems of individuals’ values or identities in conflict with societal demands and constraints (racism, sexism, urban living, family living, aging, politics, education, sexual mores, adolescence). Social issues in contemporary documentary films.

Genetics and Cell Biology (GCB)

*Department of Genetics and Cell Biology
College of Biological Sciences*

GCB 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.

GCB 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.

GCB 4025. Cell Biology Laboratory. (2 cr; QP–Biol 5004; SP–Biol 4004)

Experimental approaches to cell structure, function, and replication, including microscopy, autoradiography, cell fractionation, and molecular and chemical analyses.

GCB 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.

GCB 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.

GCB 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.

GCB 4161. Developmental Biology. (4 cr; QP–Biol 5003, Biol 5004; SP–Biol 4003, Biol 4004)
Mechanisms that govern development from gametogenesis through fertilization, embryogenesis and postembryonic development, and mechanisms of morphogenesis and differentiation. Classical and molecular approaches in a variety of model organisms including genetic models such as bacteriophage, yeast, *Drosophila*, *C. elegans*, *Arabidopsis*, zebrafish, and the mouse.

GCB 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.

GCB 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.

GCB 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.

GCB 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 5511 or equiv, status in MGIS program or #)
Introduction to desktop mapping systems such as ArcView, MapInfo and Mapitude. 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. (2 cr; SP–Geog 5561, Geog 5563 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.

Geography (Geog)

*Department of Geography
College of Liberal Arts*

Geog 1301. Introduction to Human Geography. (4 cr)
Geography of population and principal ways of life; capacity of earth for future population.

Geog 1403. 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)
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 1426. 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.

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 1973. 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 3101. Geography of the United States and Canada. (3 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 3161. 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 cr.

Geog 3181. 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 3355. 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 3361. 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 3371. Introduction to Urban Geography. (3 cr)
Character, distribution, and development of cities in present-day world. Internal and external locational relationships.

Geog 3373. Changing Form of the City. (3 cr; SP-1973 or 3371 or Hist 3901 or Hist 3902 or UrbS 3104 or #)
Urban origins, ancient cultures and cities, the medieval city, rediscovery of planning, colonial cities, industrialization and urban expansion, speculative cities, utopian cities, planning triumphs and disasters, cities as reflections of society, culture, and the past.

Geog 3374. 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 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; A-F only)
Basic concepts for analyzing the relations between capitalist development and environment in the Third World. The course is divided into three parts: basic analytical concepts about historical geography of capitalist development, geographically and historically specific case studies, and the likelihood of social and environmental sustainability.

Geog 3381. 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 3401. 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 3411. 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 3605. 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-\$EAS 3482, \$Soc 3671; 1301 or Soc 1001 or equiv in other social sciences or humanities or #; 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]; SP-Sr or grad student, Δ)
Special topics and regions. Course offered by visiting professors in their research fields.

Geog 3985. Senior Project Seminar. (4 cr)
Designed for juniors and seniors to complete the research and writing of the senior project required of all undergraduate geography majors.

Geog 3992. Directed Reading. (1-8 cr [max 12 cr]; SP-#, Δ, □)
Guided individual reading.

Geog 3993. Directed Studies. (1-8 cr [max 12 cr]; SP-#, Δ, □)
Guided individual study.

Geog 3994. Directed Research. (1-8 cr [max 12 cr]; SP-#, 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 4121. 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 cr.

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)
Meets concurrently with Geog 3211 (see description). Open to graduate students in East Asian Studies and other disciplines who wish to study the region from a geographical perspective. An additional research paper is required from the 5211 students.

Geog 5215. Geography of China. (3 cr; SP-\$3215)
Meets concurrently with Geog 3215 (see description). Open to graduate students in East Asian Studies and other disciplines who wish to study the region from a geographical perspective. An additional research paper is required from the 5215 students.

Geog 5361. Geography and Real Estate. (4 cr)
Origins and evolution of land ownership in the United States.

Geog 5371. American Cities I: Population and Housing. (4 cr; SP-\$PA 5201; A-F only)
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 5372. American Cities II: Economy, Land Use, and Transportation. (4 cr; SP-SPA 5202; A-F only)
Urban economy and its locational requirements; central place theory; transportation and urban land use, patterns and conflicts; industrial and commercial land blight; real estate redevelopment; historic preservation; emphasis on links between land use, transportation policy, economic development, and local fiscal issues; U.S.-Canadian contrasts.

Geog 5374. The City in Film. (4 cr; SP-§3374)
Meets concurrently with Geog 3374 (see description). Open to graduate students and undergraduates wishing Honors credit. Course includes one additional weekly meeting to discuss films and readings, and a project on a topic selected in consultation with the instructor.

Geog 5385. Political Economy of Development. (3 cr; SP-Sr or grad student 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 5401. 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 5411. 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 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 #)
Examination of the roles of climate change, geomorphic history, vegetation change, and soil development in the evolution of landscape patterns during the Quaternary Period, with emphasis in North America.

Geog 5444. Water Resources, Individuals and Institutions. (3 cr; SP-§WRS 5101; 1402 or 3401 or grad student 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)
This internship provides intensive hands-on experience in contemporary map production and design—ranging from GIS applications to digital prepress. Strong computer skills are essential.

Geog 5561. Principles of Geographic Information Science. (4 cr; SP-Grad student)
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 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 class in GIS or grad student 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 courses in geog including one course in cartography or advanced standing in an allied field such as landscape architecture or #)
Conceptualizing geographic topics in a form suitable for animation, selecting appropriate animation metaphors for specific ideas, using standard graphic software to prepare images for computer display and animation.

Geog 5605. Geographical Perspectives on Planning. (4 cr; SP-§3605)
Open to graduate students and undergraduates wishing Honors cr. Includes one additional weekly seminar-style meeting and a bibliography project on a topic selected in consultation with the instructor. Meets concurrently 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 student, §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-3 courses in geography, history, 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 student, #)
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 4102. Capstone Design. (3 cr; QP-Sr or #, IT student or grad IT major; SP-CE, GeoE, or Geo upper div or grad 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 div IT or grad student; SP-Upper div 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 div IT or grad student, CE 3300; SP–Upper div 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 div 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 div 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 div 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 div 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 div 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 div 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 div 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, and rivers. Through lectures, labs, and field experience, students gain a better understanding of our planet in the context of current environmental issues and global change.

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 2001. Earth Materials. (3 cr)

Study of the most common rocks and minerals and their geologic settings, focusing on properties of these materials as a basis for identification and use in industry and society.

Geo 2002. Climate Change and Human History. (3 cr)

Causes of long- and short-term climate change; frequency and magnitude of past climate changes and their geologic records. Relationship of past climate changes to development of agrarian societies and shifts in power among various kingdoms and city-states. Emphasis on the last 10,000 years.

Geo 2003. Geohazards. (3 cr)

Geologic hazards associated with earthquakes and volcanoes; emphasis on how society confronts the dangers posed by these natural phenomena. Geological and geophysical nature of earthquakes and volcanoes; fundamental causes of these phenomena; prediction and risk assessment; public policy issues.

Geo 2004. Water and Society. (3 cr)

Emphasizes 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 examining human interaction with the surface environment; influence of local land-use practices.

Geo 2005. Earth Resources. (3 cr)

Geologic aspects of energy and material resources. Resource size, life-times and environmental consequences of resource use including issues of international, citizenship and public ethics associated with resource production, distribution and use.

Geo 2006. Planets of the Solar System. (3 cr)

Recent accomplishments of the space missions; diversity and common characteristics of planetary formation; surface processes and interior dynamics; meteoritic impacts and comets; other solar systems and the possibility of life.

Geo 2111. 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 2303. 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 3093. Problems in Geology and Geophysics:

Junior. (1-4 cr [max 6 cr]; QP–#, Δ; 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-#; Δ; 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 GeoPhy major, #; SP-Sr, Geo or GeoPhy 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.

(3 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-SEEB 5601; Chem 1052 or #; SP-SEEB 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.

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 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 electromagnetism 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; 1 qtr chemistry or physics, education degree; SP-\$1009; education degree)
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. Human impact on natural cycles and evidence for global environmental changes. Required project designed to enhance ability to teach earth systems to K-12 students.

Geo 5002. Earth History for Teachers. (4 cr; QP-\$1002; education degree; SP-\$1002; education 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; education degree; SP-\$1003; education 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; education degree; SP-\$1006; education 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 with application to geology, including solution-mineral equilibria, redox processes in natural waters, geochemistry of hydrothermal fluids, and 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, 1 yr chemistry and physics or #; SP–2301, 1 yr chemistry 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 cr 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 0221. Reading German. (0 cr) Designed to teach only a reading knowledge of basic German. No prior knowledge of German is required. Vocabulary, reading strategies, and grammar for recognition are emphasized.

Ger 0222. Reading German. (0 cr; SP–0221) This course gives experience in intensive reading of German scholarly texts and enables graduate students to satisfy departmental requirements for an advanced degree. Reading grammar and discipline-specific vocabulary are emphasized.

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 or 1110) Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and the culture of the German-speaking areas.

Ger 1003. Intermediate German. (4 cr; SP–1002 or 1110 or satisfactory completion of Entrance Proficiency Test) Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments.

Ger 1004. Intermediate German. (4 cr; SP–1003 or satisfactory completion of Entrance Proficiency Test at 1104 level) 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.

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 3011. 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 3012. 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 3104. 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; 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; 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; 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; SP-¶3012)
One topic in depth dealing with the culture or civilization of German-speaking countries.

Ger 3511. 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 3512. 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/Central European Culture. (3 cr; SP-¶3012)
Study of culture, politics, and economy in Austria and Central Europe. Focus on comparative analysis of cultural and political developments in Central European countries. 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 3604. 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; 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. Requires no knowledge of German.

Ger 3631. Jewish Writers and Rebels in German, Austrian and American Culture. (3 cr; SP-No knowledge of German required; cr toward major or minor requires reading in German)
Investigation of 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.

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)
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 #)
The beginnings of German cinema at the end of the 19th century and the early 20th century. Its "golden age" during the Weimar Republic (1918-1933), including Expressionism and "New Objectivity." Its subordination to the ideological and entertainment needs of the Nazi state in the Third Reich (1933-45).

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)
Designed to help 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; 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; SP-3104 or equiv)
A single topic of contemporary German culture explored in depth.

Ger 5610. German Literature in Translation. (3 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; 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-¶3012)
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 will be 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)
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-#, Δ, □)
Guided individual reading or study.

German, Scandinavian, and Dutch (GSD)

*Department of German, Scandinavian, and Dutch
College of Liberal Arts*

GSD 3451. Major Project in German and Scandinavian. (4 cr)

Students prepare their major project in a seminar setting under supervision of a 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.

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 1111. Honors Course: Beginning Classical Greek. (3 cr; SP-¶1112, Regis in honors program or high ability as indicated by HS transcript)
Intensive Classical Greek covering material normally taught over two semesters. Students must also register for 1112 when taking this class.

Grk 1112. Honors Course: Classical Greek, Recitation. (3 cr; SP-¶1111, Regis in honors program or high ability as indicated by HS transcript)
Drills and composition exercises to help students learn classical Greek. Students must also register for 1111 when taking this class.

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 high school Greek or Δ)
Read one or more works of Plato or Aristotle in the original Greek and find out what they really mean. Texts vary with each offering.

Grk 3360. Advanced Undergraduate Greek: Religious Texts. (3 cr [max 9 cr]; SP-3114 or 3 years high school 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 high school 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 high school Greek or Δ)
Selections from Greek lyric poets.

Grk 3390. Advanced Undergraduate Greek: Romance. (3 cr [max 9 cr]; SP-3114 or 3 years high school 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 high school 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 high school 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 3960. 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 cr.

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-Grk 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 Chariton, Longus, et al.

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; SP-Students with previous study should take 1012)
For beginners whose goal is biblical or post-biblical Jewish studies, or modern Israeli Hebrew. Leads to speaking, listening comprehension, reading, and writing Hebrew with emphasis on communication proficiency. Cultural materials are incorporated.

Hebr 1002. Beginning Hebrew II. (4 cr; SP-1001 or #)
Continuation of 1001. For students whose goal is biblical or post-biblical Jewish studies, or Modern Israeli Hebrew. Leads to speaking, listening comprehension, reading, and writing Hebrew with emphasis on communication proficiency. Cultural materials incorporated.

Hebr 1012. High Performance Hebrew I. (4 cr; 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 and syntax preparatory to reading simple narrative texts in the Bible. Presentation and discussion of multiple approaches to problems and 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-#, Δ)
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 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-#, Δ, □)

Hndi 5993. Directed Readings. (3 5 cr; SP-#, Δ, □)
Guided individual reading or study of modern Hindi texts.

History (Hist)

Department of History
College of Liberal Arts

Hist 1011. 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 1012. 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 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. Introduction to Western Civilization from its Origins to ca. 1500. (3 cr; SP-§1031)
Course covers the development of western civilization from its origins in the ancient Middle East to Europe in 1500. Topics include law, religion, governments, history of ideas, and social organization.

Hist 1027. Introduction to European Civilization II: 1500 to Present. (3 cr; SP-\$1032)

European civilization has played a dominant role in world history for the past five centuries. This course deals with broad chronological periods and themes to examine that role from the early sixteenth century to the present.

Hist 1031. Survey of Western Civilization From its Origins to ca. 1500. (4 cr; SP-\$1026)

The development of western civilization from its origins in the ancient Middle East to Europe in 1500. Topics include law, religions, governments, history of ideas, and social organization.

Hist 1032. Introduction to European Civilization II: 1500 to Present. (4 cr; SP-\$1027)

European civilization has played a dominant role in world history for the past five centuries. This course deals with broad chronological periods and themes to examine that role from the early 16th century to the present.

Hist 1301. U.S. History to 1880. (4 cr)

America to 1880.

Hist 1302. U.S. History: 1880 to Present. (4 cr; SP-\$1308)

Modern America from 1880 to the present.

Hist 1307. U.S. History to 1880. (3 cr; SP-\$1301)

America to 1880.

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 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 3151. 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 3152. British History From the 17th Century. (4 cr)

Civil War, Revolution and constitutional settlement; industrialization and growth of democracy; rise and decline of British Empire.

Hist 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 3281. European Intellectual History: the 18th and 19th Centuries. (3 cr)

The first of a two-semester course dealing with logical, philosophical, and methodological issues in the historical, social, and natural sciences from the late 17th to the mid-19th century. Readings are from original sources.

Hist 3282. European Intellectual History: The Late 19th and 20th Centuries. (3 cr)

Second semester of readings in fundamental texts dealing with issues in logic, philosophy, and the methodologies of the historical, social, and natural sciences from the late 19th century to the present. Readings are from original sources.

Hist 3347. Women in Early and Victorian America: 1600-1890. (3 cr)

The varied experiences of American women 1600-1900. Topics include women's involvement in the dispossession of native peoples, westward expansion, slavery, industrialization, reform, revolution, and transformations in family life and sexuality.

Hist 3348. Women in Modern America. (3-4 cr)

History of women in the United States from 1890 to the present. Explores women's changing roles in politics, the labor force, the family, and popular culture.

Hist 3401. 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 3402. 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 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 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 3464. China in the Song, Yuan, and Ming Dynasties. (3 cr; SP-\$5464, 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 3465. China in the Ming and Qing Dynasties. (3 cr; SP-\$5465, SEAS 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 3467. State and Revolution in Modern China. (3 cr; SP-\$5467, SEAS 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 3468. Social Change in Modern China. (3 cr; SP-\$5468, SEAS 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. 20th-Century Japan: 1910s to 1990s. (3 cr)

World War I and 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, and cultural change in the postwar era.

Hist 3473. Family, School, and Work in Modern Japanese History. (3 cr; SP-\$5473, SEAS 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 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 1520s 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. Ilkhanids.

Hist 3543. Arabs Under Mamluks and Ottomans. (3 cr)
Arabs under Mamluk rule. Ottomans conquer Mamluk territory. Ottoman rule. Disintegration and re-emergence under Muhammad Ali of Egypt, dynastic struggles in Syria, rise of Young Turks and Arab revolt.

Hist 3544. Arab World 1920 Until the Present. (3 cr)
Arab world since independence; the struggle for liberation, political stability, development and unification; political structure and conflicts; impact of Arab-Israeli conflict.

Hist 3547. The Ottoman Empire. (3 cr)
Funding of Ottoman society and state to empire, 1300 to end of empire in 1920. Lands, institutions, peoples, legacy, impact on Europe.

Hist 3608. 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 3615. 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 3616. 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 3621. 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 3623. 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 entertainment. 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 3703. 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 3704. 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 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)
The long-term rise and transformation of the European economy. Main themes are emergence of capitalism and the spread of modern economic growth up to World War I; growth, instability, and structural change in the 20th century.

Hist 3714. 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 3731. 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 3747. The Habsburg Empire: 1740-1918. (3 cr)
The evolution of Habsburg rule in Central Europe from the reforms of Maria Theresa to imperial collapse in 1918. Economic and social transformation; the revolutions of 1848; political modernization; the rise of nationalism and anti-Semitism; the fin de siècle; World War I.

Hist 3748. Austria in the 20th Century. (3 cr)

Austria from the Paris Peace Treaties to the present. Political instability, social conflict, and economic stagnation between the World Wars; Nazi rule and World War II; the economic miracle, consensus politics, and neutrality after 1945; post cold war Austria.

Hist 3767. Eastern Orthodoxy; History and Culture. (3 cr)

Development of the orthodox church in Byzantium, the Islamic Near East, the Slavic world and in the diaspora; impact of orthodoxy on political and cultural institutions, interaction with other Christian and non-Christian communities; orthodox spirituality and aesthetics.

Hist 3775. History of the European Jews from the Middle Ages to the Present. (3 cr)

Social, economic, and cultural history of the Jewish people in Europe and their interaction with other peoples; history and causes of anti-Semitism; Zionism and assimilation; 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 nonmajors. 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 1920s, 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 1960s, Watergate, the conservative resurgence and the end of the Cold War.

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 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 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 nongovernmental 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 nongovernmental agencies, participation in international organizations, commercial and cultural imperialism, and war and Cold War diplomacy.

Hist 3891. American Military History. (4 cr)

Survey of the interaction of geography, politics, society, technology, and leadership in American military expansion. Examines the military influence on national development from the 17th century, and the global impact of American land, sea, and air forces in this 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 3951. 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 3961. 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 3980. Supplemental Writing in History. (1 cr [max 4 cr]; SP-Must be attached to a 3-cr 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-#, Δ, □; 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-#, Δ, □; 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 agriculturists, 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 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 student 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 student 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 student 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 student; 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 student 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 student 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 student 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 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 5337. Criminal Justice in the United States: 1900-2000. (4 cr; SP-Jr or sr)

Major developments in 20th-century U.S. criminal justice. The influences of ideology, culture, and social science on defining crime and on crime control policies and practices.

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 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, \$EAS 3464)

China during the Song (976-1279), Yuan (1279-1368) and Ming (1368-1644) dynasties, political institutions, and social structures. Attention to primary sources and how historians ask and answer questions about the past.

Hist 5465. China in the Ming and Qing Dynasties. (3 cr; SP-\$3465, \$EAS 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, \$EAS 3467)

Modern China's political evolution including the Taiping Rebellion, Republican Revolution, rise of Nationalist and Communist parties, Maoist era; reform under Deng Xiaoping, and the emergence of democracy in Taiwan.

Hist 5468. Social Change in Modern China. (3 cr; 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 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 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)
From the times of Ferdinand and Isabella through the Napoleonic era, we analyze the historiography, documents, and archives of Early Modern Spain. 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 student 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 student 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 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 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 siècle; 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 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 student or advanced undergrad 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 student or advanced undergrads 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; SP-Grad student 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 student 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; SP-#; A-F only)

Recurring themes in Third World History. 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 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 student 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 student or advanced undergrad with #; A-F only)

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 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)

Medical School

HMed 3001 Health Care in History I. (3 cr)

Introduction to the intellectual and social history of European and American medicine and health care from classical antiquity through the 18th century.

HMed 3002. Health Care in History II. (3 cr)

Introduction to the intellectual and social history of European and American medicine and health care in the 19th and 20th centuries.

HMed 5002. Public Health Issues in Historical Perspective. (3 cr; SP-History of medicine or history of science course recommended)

HMed 5035. The Germ Theory and Modern Medicine. (3 cr; SP-History of medicine or history of science course recommended)

Study of the development of the modern germ theory of disease and of its applications in medicine and public health. Emphasis on developments between 1860 and 1950.

HMed 5045. The Modern Medical Profession. (3 cr; SP-History of medicine or history of science course recommended)

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.

HMed 5200. Early History of Medicine to 1700. (3 cr; A-F only)

Palaeopathology, primitive medicine, medicine in ancient and classical civilizations, transmission of Greek medicine through Islam to the Latin West, medieval medicine, revival of anatomy; discovery of the circulation of the blood, of the lacteal vessels, the lymphatic system, and the capillaries; new concepts of disease and treatment in the 17th century.

HMed 5201. History of Medicine from 1700 to 1900. (3 cr)

Founding of hospitals, medical teaching at Leyden and Edinburgh, anatomical teaching and the rise of surgery and pathological anatomy; inoculation for smallpox and discovery of vaccination; discovery of percussion and mediate auscultation; anatomical definition of diseases; discovery of anesthesia; epidemiology and public health; germ theory of disease; antiseptic surgery; rise of bacteriology; discovery of diphtheria antitoxin.

HMed 5202. History of Medicine in the Twentieth Century. (3 cr)

Rise of immunology; recognition of nutritional deficiency diseases; discovery of vitamins; campaign for pure water and pasteurized milk; battle against tuberculosis; World War I; diphtheria immunization; campaign to control malaria; isolation of insulin; discovery of sulfa drugs, penicillin, and other antibiotics; blood transfusion and control of fluid and electrolyte balance, World War II; polio vaccines; heart surgery; immune deficiency diseases; organ transplantation; impact of Medicare and managed health care; AIDS; resurgence of infectious diseases; effects of increased life expectancy.

HMed 5210. Seminar: Emergence of Modern Medicine. (3 cr; A-F only)

HMed 5211. Seminar: Emergence of Modern Medicine. (3 cr; A-F only)

HMed 5940. Topics in the History of Medicine. (3 cr; SP-History of medicine or history of science course recommended for undergrads)

Exploration of topics central to the history of medicine. Topics vary yearly. Emphasis on mid-18th century to the present.

History of Science and Technology (HSci)

Program in History of Science and Technology Institute of Technology

HSci 1714. Technology and Western Civilization: Since 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 the 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, Biol 1009, Biol 1101 or #; SP-\$5242, Biol 1009 or Biol 1101 or #)

Development of evolutionary thought in the 19th and 20th centuries, emphasizing Darwin's theory of evolution by natural selection; scientific, economic, political, religious, and philosophical dimensions of Darwinism; comparative reception of Darwinism in different countries and 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, 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 3333. Honors Course: Issues in 20th 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 the 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 missiles.

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; QP-Biol 1009 or Biol 1101 or #; SP-\$3242; Biol 1009 or Biol 1101 or #)

Development of evolutionary thought in the 19th and 20th centuries, emphasizing Darwin's theory of evolution by natural selection; scientific, economic, political, religious, and philosophical dimensions of Darwinism; comparative reception of Darwinism in different countries and 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 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 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 1001. Honors Colloquium: Introduction to the Arts and Sciences. (1 cr; SP-1st term fr, honors div regis; S-N only)

Discussions led by faculty representing a variety of disciplines. Introduction to the problems these disciplines address and the methods they use.

HCol 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1110, 1120, 1130, and 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. (1-3 cr; SP-Fr or soph, honors div regis, #, Δ, □)

For additional research related to a colloquium topic.

Honors Seminar (HSem)

CLA Honors Program

College of Liberal Arts

HSem 3010, 3020, 3030, 3040, 3050, 3060, 3070, 3080, 31130, 3120, 3130, and 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. (1-3 cr; SP-Jr or sr, honors div regis, #, Δ, □)

For additional research related to a seminar topic.

Horticultural Science (Hort)

Department of Horticultural Science

College of Agricultural, Food, and Environmental Sciences

Hort 1001. Plant Propagation. (4 cr)

Principles and techniques of propagating plants by seeds, cuttings, grafts, buds, layers, and division. Lectures on principles; labs on practice of various propagating techniques.

Hort 1002. Home Horticulture. (3 cr; 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 the Home and Garden. (3 cr)

Provides a foundation in soils; botany; entomology; plant pathology; indoor, herbaceous and woody plants, lawns, fruits, vegetables; pesticides; and wildlife. Geared at an introductory level with an emphasis on Extension publications and resources useful in answering consumer horticulture questions.

Hort 1011. Herbaceous Landscape Plants. (3 cr)

Taxonomy, identification, ecology, and landscape uses of annuals, perennials, wildflowers, ferns, tender and hardy bulbs, including tropicals and sub-tropicals used in interior landscapes.

Hort 1012. Woody Landscape Plants. (3 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 home, including principles and elements of design, wedding arrangements, corsages, and the 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–#|PBio 3131, 1 plant science course, Chem 1051 or equiv or #; SP–#|Biol 3005, 1 plant science course, Chem 1021 or equiv or #; A-F only)
The effects of the environment on plant growth and physiology and how horticulturists manipulate the environment to produce high quality plants. Biol 3005 must be taken concurrently.

Hort 3018. Landscape Operations. (1 cr)

A discussion/lab course taught by a team of faculty, staff, and industry professionals. Demonstration and hands-on experiences associated with landscape operations in areas such as planting, mulching, staking, pruning, fertilization, large tree care, seeding, and sodding, aerification, calibration, irrigation, and surveying.

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, 3003; A-F only)
Production, maintenance, and marketing of woody ornamental plants. Establishment and management of nursery or garden centers. Lab and field trips required.

Hort 4051. Floriculture Production and Management I. (4 cr; QP–1036, 1022, 3002, #; SP–1011, 3002, 3005, #; A-F only)

Problem-solving and management practices important to propagation, production, and utilization of floral crops with emphasis on potted plants and hydroponics. Learn to grow, market, and utilize 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 student, #; SP–Biol 1009 or equiv or grad student, #)

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. (2 cr)

A discussion/lab course taught by a team of faculty, staff, and industry professionals. Demonstration and hands-on experiences associated with landscape operations in areas such as planting, mulching, staking, pruning, fertilization, large tree care, seeding, and sodding, aerification, calibration, irrigation and surveying. Written report required on special project or experiment.

Hort 5021. Landscape Design, Implementation and Management II. (3 cr; QP–5041 or ApEc 1250 or #; SP–4021 or ApEc 1250)

Residential, commercial, and recreational sites. Architectural and graphic techniques, plan drawings, sections elevations, perspectives, and working drawings. Grading and site manipulation including surveying, irrigation, and drainage. Development of business and grounds management plans. Landscape estimating and bidding.

Hort 5022. Topics in Plant Science for Teachers. (1-4 cr; QP–Biol 1103 or equiv or course in Educ; no cr for Hort majors or grads; SP–Biol 2012 or equiv or course in Educ; no cr for Hort majors or grads; UC only)

Hort 5023. Public Garden Management. (2 cr; SP–Qualified students may register for grad cr)

Management of public gardens including various areas of operations such as planning, educational programming, plant conservation and curation, public relations and garden, personnel, and business management.

Hort 5024. Landscape Development. (1 cr)

Hands-on experience in many of the processes of landscape development. Students observe and participate through “plan takeoffs”, site evaluation and preparation, planting, installation and construction. Students are expected to perform tasks associated with landscape development including equipment operation, hard good, and plant handling.

Hort 5031. Sustainable Fruit and Vegetable Production Systems. (4 cr; QP–1036 or #; SP–1001, 3005)

Integrated management of horticultural food production systems with an ecological perspective. Evolution, taxonomy, environmental control of plant growth and development, site selection. Intensive use of writing, decision cases, discussion.

Hort 5041. Nursery Production and Management II. (3 cr; QP–5046 or #; SP–4041; A-F only)

An 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)

Hands-on experience in many of the processes of nursery production. Students propagate, grow, and harvest plants as well as operate 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 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 1171. Freshman Seminar. (1-3 cr; SP–Fr only)
Small group seminar for freshmen only on a topic related to human ecology announced in advance.

HE 1200. First-Year Honors Colloquium. (1-2 cr [max 4 cr]; QP–Admission to CHE honors program; SP–Admission to CHE honors program; A-F only)
Students investigate diverse ways of knowing about the world; the fields of study organized to understand the human environment; and their place within the academic and career pathways that cross within these intellectual traditions and professional fields.

HE 1201. Academic Choice and Career Development. (1 cr; S-N only)

Identify and develop your academic and professional goals through career decision making, self assessment, occupational research, and job search strategies. Build a career plan using college experience, coursework, internships, community service, campus involvement, work experience, travel, and hobbies.

HE 4140. Special Topics in Human Ecology. (1-4 cr [max 12 cr]; QP–Depends on topic; SP–#)
In-depth study of a selected topic.

HE 4150. Honors Seminar. (1-3 cr [max 6 cr]; QP–Admitted to honors program; SP–Admitted to honors program)

Discuss issues of interest in human ecology professions. Topics specified in *Class Schedule*.

HE 4160. Honors Capstone Project. (1-4 cr [max 4 cr]; QP–Admission to CHE honors program; SP–Admission to CHE honors program, #; A-F only)
A scholarly “capstone” project that gives students an opportunity to individualize the honors experience by making connections between aspects of their major program and their special academic interests.

Human Resource Development (HRD)

Department of Work, Community, and Family Education

College of Education and Human Development

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

Overview of fields of human resource development and adult education. Includes societal context, theories, processes, definitions, philosophies, goals, sponsoring agencies, professional roles, participants, and resources. Focus on the unique characteristics and ways the fields overlap and enhance one another.

HRD 5101. Foundations of Human Resource Development. (1 cr)

Introduction to human resource development as a field of study and practice.

HRD 5102. Economic Foundation of Human Resource Development. (1 cr; 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 systems 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–Two 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 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; SP–\$BIE 5601; 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; SP–\$AdEd 5611)

Exploration of the implications of future developments in several areas of 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–\$AdEd 5612; 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; SP–\$BIE 5624; A-F only)
Strategies and techniques for developing effective sales people.

HRD 5625. Technical Skills Training. (3 cr; SP–\$BIE 5625)

Analyzing technical skills training practices in business and industry. Systems and process analysis and troubleshooting of work behavior; design methods and developing training materials.

HRD 5626. Customer Service Training. (3 cr; SP–\$BIE 5626; 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; SP–\$BIE 5627)

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 5628; 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; SP–\$BIE 5629; A-F only)

Identifying content, stating objectives, sequencing, planning lessons, selecting methods and media for instruction, and evaluation and feedback.

HRD 5661. Instructional Methods in Business and Industry Education. (2 cr; SP–\$BIE 5661)

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 5662; 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 areas of HRD. Content varies by offering.

HRD 5821. Diversity Issues and Practices in Work, Community, and Family Settings. (3 cr; SP–\$WCCE 5821)

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.

HRD 5822. Diversity and Organizational Transformation in Education, Work, and Community. (2 cr; SP–\$WCCE 5822)

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)

Introduction to theory and practice related to staffing decisions: recruitment, selection, promotion, demotion, transfer, dismissal, layoff, and retirement. Analyze staffing from strategic and operational perspectives. Legal issues.

HRIR 3032. Training and Development. (2 cr)

Introduction to theory, research, and techniques related to design, implementation, and evaluation of employee training programs. Training as a process for influencing individual and organizational outcomes, such as performance, job satisfaction, and 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)

Introduction to compensation and reward programs. Theories of organizational and employee behavior used in design and implementation of pay programs. Design, implementation, and evaluation of job evaluations, 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 nonunion sector are considered.

HRIR 5000. Topics in Human Resources and Industrial Relations. (1-8 cr)

Selected topics of current relevance to human resource management and industrial relations.

HRIR 5021. Systems of Conflict and Dispute Resolution. (4 cr)

Introduction to theoretical and practical treatment of conflict settlement in interpersonal, work-related, community, business, and international settings. Lectures, discussions, observations of actual dispute resolution sessions, and lab exercises with students participating in dispute resolution simulations applied to real world conflicts.

HRIR 5022. Managing Diversity. (2 cr)

Investigate ways to effectively manage the increasingly diverse workforce. Human resource practices with a commitment to diversity. Learn how to incorporate diversity into decision making to enhance organizational performance.

HRIR 5023. Personnel and Industrial Relations Law. (2 cr)

Human rights, equal employment, compensation and benefit laws, employee protection laws, labor relations laws. Special issues such as wrongful discharge, sexual harassment, and defamation are discussed in the context of statute, case law, and their application to the work setting.

HRIR 5024. Employee Performance: Appraisal and Management. (2 cr)

Learn how employee performance is organized, appraised, and managed for achieving organizational and individual performance goals. Job design standards, employee appraisal systems, and worker satisfaction.

HRIR 5061. Labor Policy. (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)

Humanities Program

College of Liberal Arts

Hum 1001. Humanities in the West I. (4 cr; SP-\$3001)

Greek and Roman civilization, rise of Christianity. Epic and lyric poetry, drama, architecture, sculpture, philosophy religion. Integrative study of works by creative figures such as Homer, Hesiod, Aeschylus, Sophocles, Euripides, Aristophanes, Plato, Aristotle. Caesar, Lucretius Virgil, Ovid, Petronius, Augustine, Boethius.

Hum 1002. Humanities in the West II. (3 cr; 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 and humanistic thought; roots of existentialism; art, music. Integrative study of works by creative figures such as 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 and humanistic thought; roots of existentialism; art, music. Integrative study of works by creative figures such as 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.

This is I through Z of the course section of the 1999-2000 Undergraduate Catalog of the University of Minnesota.

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 student 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 student)
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 student)
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 student, #)
Guided individual reading or study.

Hum 4971. Honors Course: Directed Studies. (1-4 cr; SP-Jr or sr or grad student, #)
Guided individual reading or study.

Industrial Engineering (IE)

*Department of Mechanical Engineering
Institute of Technology*

IE 4521. Statistics, Quality, and Reliability. (4 cr; QP-Math 1261 or equiv; SP-Upper div)
Statistical tools used by engineers to plan, control, and improve quality and reliability. Basic inferential statistics and statistical hypothesis testing, quality function deployment and reliability testing, statistical process control, factorial designs and design of experiments, and empirical modeling of process data.

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-Upper div or grad student, 4521 or equiv in intro statistics)
Role of experimentation in design, control, optimization, and validation of new products and manufacturing processes. Statistical significance and hypothesis testing, single-factor experiments (t-tests and ANOVA), multiple factor experiments (two-level full and fractional factorial designs), optimization and response surface methods, and other empirical modeling techniques.

IE 5531. Engineering Optimization I. (4 cr; QP-Math 1261, IT or grad student; SP-Upper div or grad students)
Basic concepts in optimization of deterministic systems, with problems in areas such as resource allocation, scheduling, facility location, and plant layout. Linear programming, algebra, and geometry of linear models, simplex method, sensitivity testing, graph theory, integer and dynamic programming.

IE 5541. Project Management. (4 cr; QP-IT sr or grad student; SP-Upper div or grad student)
Practical understanding of project management, including scheduling, planning, budgeting, staffing, and task and cost control; how to communicate with, motivate, and manage team members; applications in quality improvement and product development teams and large-scale, complex projects.

IE 5551. Production Planning and Control. (4 cr; QP-IEOR 5040, ME 3900, IT or grad student; SP-Upper div or grad student)
Modern methods of production planning and inventory. Inventory analysis and optimization, demand forecasting, capacity planning, material requirement planning, just-in-time manufacturing, production scheduling, and shop floor control. New production planning and control methodologies such as time-based manufacturing, Theory of Constraints, group technology, and flexible manufacturing.

IE 5552. Design and Analysis of Manufacturing Systems. (4 cr; QP-IEOR 5010, IEOR 5020, IEOR 5030, IEOR 5040, IT or grad student; 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)
Discrete event simulation. Using an integrated simulation/animation environment, students learn to create, analyze, and evaluate realistic models for a variety of manufacturing, assembly, and material handling systems. Experimental design for simulation, random number generation, selection of input distributions and simulation output evaluation.

IE 5554. Facility Planning. (4 cr; QP-IT or grad student; SP-Upper div or grad student)
Design and planning of manufacturing and service facilities. Warehousing and storage, facility layout and location, material handling, and 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 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-Sr, 2 courses in major; SP-Sr, 2 courses in 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.

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-43202, Δ; A-F only)
Learning by working in IS activities and receiving appropriate training from a sponsoring organization. Custom designed to meet preestablished learning objectives. "Work practice" plan required and must be approved by the organization and the director of IDSc undergraduate studies.

Institute of Technology (IofT)

Institute of Technology

IofT 1101. Environmental Issues and Solutions. (4 cr; SP-High school chemistry or equiv, one yr high school algebra)
Addresses the complexity of environmental problems. Case studies stress the importance of science in understanding and solving a variety of environmental problems. Complementary lab exercises

IofT 1312. Exploration of Careers in Science and Engineering. (2 cr; S-N only)
Topics presented by employers and Career Services staff include career exploration using career development self assessments, career decision making, writing resumes and cover letters, identifying and contacting employers, interviewing, and using Career Services to find internships, co-ops, and permanent positions.

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: Public Policy and Practice. (2 cr)
Survey federally and state-mandated benefits: workers compensation, unemployment insurance, and social security; compliance with legally mandated benefits; tax issues. Design and application of nonmandatory compensation benefit programs (e.g., health insurance, pensions, cafeteria benefit plans, pay for time not worked).

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-Ins 5200)
Personal financial planning: financial statements, cash flow and debt analysis, time value of money. Management of liability, disability, life, medical, and property risks. Investments, and portfolio management. Tax reduction, employee benefits, retirement and estate planning. Ethical issues and regulation of financial planners.

Interdepartmental Study (ID)

Office for Special Learning Opportunities College of Liberal Arts

ID 1201. Career Exploration I. (1 cr)
Intended for freshmen and sophomores. An exploration of the self and the 21st-century world of work as a foundation for choosing a major and career path. Process allows for in-depth assessment of interests, skills, personality, and values.

ID 1202. Career Exploration II. (1 cr; QP-1201 or #; SP-1201 or #)
Intended for freshmen or sophomores. A practical introduction to how classes, research projects, internships, community service, work experience, and travel play major roles in your future success. Internship/career search strategies and tools are taught including resume writing, networking, and internet research.

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 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. (1-16 cr; QP-Δ; contact OSLO, 345 Fraser Hall, 626-2044; SP-Δ; contact OSLO, 345 Fraser Hall, 626-2044)

Intensive off-campus spring semester program combining interdisciplinary field study, seminar work, and professional internship. Pedagogical approach blends structured field experience with academic analysis. Twin Cities are source of interpretative materials for exploring urban life, social issues, relationships between subculture/lifestyles.

ID 3581. HECUA Off-Campus Study Program: City Arts. (1-16 cr; QP-Δ; contact OSLO in 345 Fraser Hall, 626-2044; SP-Δ; contact OSLO in 345 Fraser Hall, 626-2044)

Intensive off-campus fall semester program combining interdisciplinary field study, seminar work, and professional internship in Twin Cities. Themes include the arts in urban society, organization of art worlds, and design of cities in terms of quality of urban life.

ID 3993. Directed Study. (1-4 cr [max 8 cr]; QP-#, Δ, □; SP-#, Δ, □)

Guided individual reading or study.

Interdisciplinary Archaeological 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 *Class Schedule*.

International Relations (IntR)

Institute for Global Studies

College of Liberal Arts

IntR 3101. 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.

IntR 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.

IntR 3151. 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.

IntR 3550. Honors Course: Supervised Research Paper. (4 cr)

IntR 3552. Honors Seminar: The Making of the Modern World. (3 cr; SP-MacArthur program or IntR honors majors; A-F only)
Explores the making of the modern world, including an examination of interaction across ecological frontiers, changing power relations, the restructuring of systems of production, and the creation of new cultures and identities.

IntR 3553. Honors Seminar: Change in the Contemporary Global Order. (3 cr; SP-#; A-F only)
Important issues of global change: population growth and human migration; human relations with the physical environment; struggles for popular power and sustainable democratic institutions; relations and conditions of work; and cultural representations of social identities. Attention to the U.S.-Mexican arena.

IntR 3558. Junior Honors Research Seminar. (3 cr; SP-Jr honors IntR major; A-F only)
Theoretical perspectives and methods available to researchers in international studies.

IntR 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*.

IntR 3900. Topics in International Relations. (3 cr)
Selected issues and topics in international relations. Topics will vary every semester. Topics specified in *Class Schedule*.

IntR 3981. 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.

IntR 3993. Directed Studies. (1-4 cr [max 12 cr]; SP-#, Δ, □)

IntR 5900. Topics in International Relations. (3 cr)
Proseminar. Selected issues in international relations. Topics vary every semester.

Italian (Ita)

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 director of undergraduate studies permission)
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 cr, 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 will be studied in the context of a broad 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 cr, 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 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 3090. Honors Course: Tutorial. (1-4 cr)

Jpn 3162. Traditional Japanese Literature in Translation. (3 cr; SP-Knowledge of Japanese not 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.

Jpn 3166. Japanese Film. (3 cr; A-F only)
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 3451. Introduction to Japanese Linguistics. (4 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, at least one 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, at least one 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 nonfiction 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-yr 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, \$ReIA 1034, \$ReIA 3034; knowledge of Hebrew not 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 3034. Introduction to Judaism. (3 cr; SP-\$1034, \$ReIA 1034, \$ReIA 3034; knowledge of Hebrew not 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. Sections 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, Oz, Grossman, Librecht, Yehoshua, 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 reestablishment 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 3632. 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 5111. Problems in Historiography and Representation of the Holocaust. (3 cr; QP-RelS 3541; SP-JwSt 3521 or RelS 3521 or #)

Focuses on issues connected with the Holocaust. Inclusiveness of other groups, Holocaust vs. "Shoah," historiographical conflicts about perpetrators, an examination of the problems of representation in literature and art, problems of narrative theology after Auschwitz.

JwSt 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

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, 4251, 4274, 4316, 4501, 4531, 4611, 4615, 4721, 4725, 4726, 4731, 4801, 5541, 5601, 5606, 5741, 5771, 5777, 5825

Independent study courses: 3990, 3993, 3996, 4993, 5990, 5993

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 3004. Information for Mass Communication. (3 cr; SP-Jour major or minor, EngC 1011 or equiv or exemption, Δ: A-F only)
Information resources for professional and 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-Jour major or minor, 3004, Δ: SP-Jour major or minor, 3004, Δ: A-F only)
Visual media and the role of images in mass communication. Social, cultural, historical and psychological approaches to visual communication are explored and "hands-on" exercises provide an understanding of image making processes.

Jour 3007. The Media in American History and Law: Case Studies. (3 cr; QP-Jour major or minor, 3004, Δ: SP-Open to non-jour major; jour major must have course approval on prog plan; pre-jour major 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 major must have course approval 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; SP-Jour major or minor, 3004 or §3004, pass 40 wpm keyboard test with 6 or fewer errors, Δ: A-F only)
Fact gathering and journalistic writing. Problems in judgment and handling of news and news features.

Jour 3121. Public Affairs Reporting. (3 cr; SP-Jour major, 3004, C- or higher in 3101, pass 40 wpm keyboard test with 6 or fewer errors, Δ: A-F only)
Reporting and editing news of courts and municipal, county, state, and federal administrative and legislative agencies.

Jour 3155. Publications Editing. (3 cr; SP-Jour major, 3004, C- or higher in 3101, pass 40 wpm keyboard test with 6 or fewer errors, Δ: A-F only)
Selection and editing of news-editorial content of newspapers, brochures, magazines, newspaper makeup, magazine format. Press association teletype service. Lecture and laboratory.

Jour 3159. Public Relations. (3 cr; SP-Jour major or minor, EngC 1011 or equiv or exemption, Δ: A-F only)
History and development of public relations practice and principles. Professional writing assignments in a variety of institutional settings. Analysis and critique of public relations in contemporary society.

Jour 3173. Magazine Writing. (3 cr; SP-Jour major, 3004, C- or higher in 3101, pass 40 wpm keyboard test with 6 or fewer errors, Δ: A-F only)
Writing feature articles for consumer and trade publications; study of market free-lance methods.

Jour 3179. Public Relations Writing and Campaign Tactics. (3 cr; SP-Jour major, 3004, 3159 or 3201, Δ: A-F only)
Designed to develop basic skills in public relations tactics with a strong emphasis on professional skills in writing for a variety of audiences and purposes. Assumes a broad knowledge of public relations principles and strategic approaches.

Jour 3201. Principles of Advertising. (3 cr; SP-Jour major or minor, EngC 1011 or equiv or exemption, Δ: A-F only)
Principles related to development of advertising campaigns: market analysis, positioning, creative and media strategies, evaluation. Structure of advertising industry. Economic, social, and regulatory contexts influencing advertising.

Jour 3241. Creative Strategy and Copywriting. (3 cr; SP-Jour major, 3004, 3201, Δ: A-F only)
Advertising appeals and strategy; advertising for print and broadcast. Individual and group projects.

Jour 3251. Advertising and Public Relations Research. (3 cr; QP-Jour major, 3004, 3159 or 3201, Δ: SP-Jour major, 3004, 3159 or 3201, Δ: A-F only)
Introduction to applied quantitative and qualitative research methods used in advertising and public relations campaign development, management, and evaluation.

Jour 3321. Basic Media Graphics. (3 cr; SP-Jour major, 3004, Δ: A-F only)
Basic introduction to mass media graphics, including design principles and history, production technology, typographic legibility research, analysis of printing, and production costs.

Jour 3451. Television and Radio News. (3 cr; SP-Jour major, 3004, C- or higher in 3101, pass 40 wpm keyboard test with 6 or fewer errors, Δ: A-F only)
News writing, reporting, video photography and 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 approval 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 approval on prog plan; pre-jour should not enroll; SP-Open to non-jour major; jour major must have course approval on prog plan; pre-jour major 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 approval on prog plan; pre-jour major 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 major, jour major must have course approval on prog plan; pre-jour major should not enroll; A-F only)
Designed to give an understanding of what it means to act "ethically," the tools to identify and analyze ethical issues, and knowledge of the ethical norms of print and broadcast journalism, photojournalism, public relations, and advertising.

Jour 3776. Mass Communication Law. (3 cr; SP–Jour major or minor, 3004, Δ; 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, the regulation of broadcasting and advertising, antitrust controls, legal and ethical rules affecting journalistic practice.

Jour 3796. Mass Media and Politics. (3 cr; SP–Open to non-jour major, jour 1001 or Pol 1001 or #, jour major must have course approval on prog plan; pre-jour major should not enroll; 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 cr; SP–Jour major or minor, 3004, Δ; A-F only)
Topics specified in *Class Schedule*.

Jour 3993. Directed Study. (1-6 cr [max 6 cr]; SP–Jour major or minor, 3004, #, Δ, □; A-F only)
Directed study, projects.

Jour 3996. Directed Instruction. (1 cr; QP–Jour major, #, one professional course for professional majors, one adviser-approved course for mass comm majors, Δ; SP–Jour major, #, one professional course for professional majors, one adviser-approved course for mass comm majors, Δ; S-N only)
Internship supervised by communications organization at which the student is working and by the student's academic sponsor.

Jour 4131. Interpretive Reporting. (3 cr; SP–Jour major, 3004, 3121 or 3173 or 4155, pass 40 wpm keyboard test with 6 or fewer errors, Δ; A-F only)
Advanced problems in reporting about government, politics, social problems, and the arts.

Jour 4155. Advanced Reporting Methods. (3 cr; SP–Jour major, 3004, C- or higher in 3101, pass 40 wpm keyboard test with 6 or fewer errors, Δ; A-F only)
Investigative techniques for the mass media, including quantitative research methods, use of records and documents, analysis of statistics, advanced interviewing, and methods for adverse conditions.

Jour 4159. Case Studies in Public Relations. (3 cr; SP–Jour major, 3004, 3159, Δ; A-F only)
Case studies approach applies public relations principles to solve problems in business, government, education and community. Designed to enable students to sharpen their perceptions, insights and judgments in examining practical and ethical questions.

Jour 4171. Arts Reviewing and Reporting. (3 cr; SP–#, Δ for nonmajors; jour major, 3004, C or higher in 3101, pass 40 wpm keyboard test with 6 or fewer errors; A-F only)
Covering the arts and entertainment beat both as a reviewer and a reporter. Assignments follow the flow of the Twin Cities arts/entertainment season including its controversies. Weekly writing assignments, readings, field trips, guest lectures from artists and arts journalists.

Jour 4174. Magazine Editing and Production. (3 cr; SP–Jour major, 3004, 3155 or 3173 or 3321 or 5302 or prof experience for 5302, #, Δ; A-F only)
Writing, editing, illustration, design, layout, photocomposition of a single-issue magazine.

Jour 4251. Psychology of Advertising. (3 cr; SP–Psy 1001, jour major or minor, 3004, Δ; A-F only)
Psychological principles, research techniques, and applications in advertising and selling. Consumer attitudes and behavior. Psychological mechanisms upon which effectiveness of advertisements and commercials depends.

Jour 4261. Advertising: Media Analysis. (3 cr; SP–Jour major, 3004, 3159 or 3201, Δ; A-F only)
Print and electronic media and their role in advertising; selection and scheduling; rate structures and policies; evaluation and use of media and market measurements and data.

Jour 4263. Advertising and Public Relations Campaign Planning. (3 cr; SP–Jour major, 3004, 3241 or 5261 or 5159, Mktg 3000 or #, Δ; A-F only)
The development of campaign strategy and tactics. Emphasis on planning and decision-making skills needed to design effective advertising campaigns.

Jour 4274. Advertising in Society. (3 cr; SP–Jour major or minor, 3004, Δ; 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 4316. Theories of Visual Communication. (3 cr; SP–Jour major or minor, 3004, 3006 or #, Δ; A-F only)
Perspectives on the study and analysis of visual communication; contributions from sociology, anthropology, psychology, and history. Message structure, systems of production, and use of visual media.

Jour 4321. Publication Graphics. (3 cr; SP–Jour major, 3004, 3321, Δ; A-F only)
The design process as it applies to the production of magazines, brochures and newsletters. Use of the computer as a design tool to prepare electronic documents for the printing process.

Jour 4441. Documentary Production. (3 cr; SP–Jour major, 3451, #, Δ; A-F only)
Study of various types of "long form" news and reality-based production for both cinema and television. Preparation of a documentary of broadcast quality using nonlinear editing techniques. Students work in teams. Lecture plus lab and production hours.

Jour 4442. Advanced Television News. (3 cr; SP–Jour major, 3004, 3451, pass 40 wpm keyboard test with 6 or fewer errors, Δ; A-F only)
Preparation and delivery of television newscasts. The industry's problems, legal and ethical considerations, social impact of electronic journalism. Lecture plus lab and news production hours.

Jour 4501. Communication and Public Opinion I. (3 cr; SP–Jour major or minor, 3004, Δ; A-F only)
Theories of communication process, persuasion, and attitude change. Functions of interpersonal and mediated communication in diffusion of information and opinion formation.

Jour 4531. Communication and Public Opinion II. (3 cr; QP–Jour major or minor, 3004, 5501 or Soc 5355, Δ; SP–Jour major or minor, 3004, 5501 or Soc 5355, Δ; A-F only)
Advanced study of theories and research on opinion formation, persuasion and diffusion of information. Social science contributions to studies of the process and effects of mass communication.

Jour 4611. Development of American Broadcasting. (3 cr; SP–Jour major or minor, 3004, Δ; A-F only)
Historic and economic development of radio and television in the United States; government regulation, industry self-regulation, forms of social control; issues in contemporary broadcasting; the journalist as broadcaster.

Jour 4615. History of Visual Communication in the Mass Media. (3 cr; SP–Open to non-major, jour major must have course approval on prog plan; pre-jour major should not enroll; A-F only)
Social history of photography, film, and video. Informational, documentary, propaganda, and

entertainment functions of visual communication. The rise and influence of visual media industries and public image making.

Jour 4721. Mass Media and U.S. Society. (3 cr; SP–Jour major or minor, 3004, 1 writing-intensive course recommended or #, Δ; A-F only)
Economic, political, and social determinants of character and content of mass communications in America. Impact, structure, functioning of mass media. Problems, prospects, and criticism. Professionalism, technology, reform.

Jour 4725. Management of Media Organizations. (3 cr; SP–Jour major or minor, 3004, Δ; A-F only)
Introduction to concepts and principles of media management including strategic planning, leadership, organizational strategies, ethical and legal issues. Exposes students to working in teams, understanding a balance sheet and income statement, motivating and promoting people.

Jour 4726. Case Studies in Modern Media Management. (3 cr; SP–3004, 4725 recommended, jour major or minor, Δ for jour students; #, Δ for non-jour students; A-F only)
Case studies of how media managers make decisions dealing with money, marketing, product, personnel, and production. Examination of the interaction between quality, price, service, and the limits of technology.

Jour 4731. Honors Course: Communications Problems and Issues. (3 cr; SP–Jour major or minor, 3004, sr, #, Δ, honors div regis; A-F only)
Individual project and seminar of major problems and issues of communication.

Jour 4801. International Communication. (3 cr; QP–Jour major or minor, 3004, Δ; SP–Jour major or minor, 3004, Δ; A-F only)
Structures, processes, and consequences of international mass communication. Problems in the free flow of information. Roles of international organizations. Mass communication in social, political, and economic development; implications for conflict resolution.

Jour 4993. Honors: Directed Study. (1-6 cr [max 6 cr]; SP–Jour major or minor, 3004, Δ, □, #, B avg, honors div regis; A-F only)
Independent study; projects.

Jour 5541. Mass Communication and Public Health. (2-3 cr; SP–Jour major or minor or grad student, 3004, 12 cr in social or behavioral sci; A-F only)
Role, functions, and effects of mass media on public health; planned and unplanned effects. Review and analysis of literature to understand how theories, models, and assumptions of mass communication research relate to public health.

Jour 5601. History of Journalism. (3 cr; SP–Jour major or minor, 3004, Δ; A-F only)
Development of American newspapers and periodicals from beginnings in Europe to present day; rise of radio and television; relation of communications development to political, economic, and social trends.

Jour 5606. Literary Aspects of Journalism. (3 cr; SP–Jour major or minor, 3004, #, Δ; A-F only)
Literary aspects of journalism as exemplified in, and influenced by, works of English and American writers past and present. Lectures, discussions and weekly papers.

Jour 5741. Minorities and Mass Media. (3 cr; QP–Jour major or minor, 3004, Δ; SP–Jour major or minor, 3004, Δ; A-F only)
Analysis of relationships between mass media and communities of color in the United States. Focuses on issues of content and control.

Jour 5771. Media Ethics: Principles and Practice. (3 cr; SP–Open to non-major, jour major must have course approval on prog plan; pre-jour major should not enroll; A-F only)
Assesses the effectiveness of the accountability mechanisms employed by the media; examines key media principles and their ethical foundation.

Jour 5777. Contemporary Problems in Freedom of Speech and Press. (3 cr; SP—Jour major or minor, 3004, Δ, A-F only)
Legal and constitutional derivation of freedom of speech and press with emphasis on case law, judicial theories, doctrines, tests, and values. Symbolic, commercial, compelled speech, speech plus, petition and assembly, leading press cases, and legal research techniques.

Jour 5825. World Communication Systems. (3 cr; SP—Jour major or minor, 3004, Δ, A-F only)
Mass media systems of the world described and analyzed regionally and nationally; historical roots, social, economic, and cultural context; contemporary conditions and prospects; relevance of journalism and mass communication to international affairs.

Jour 5990. Special Topics in Mass Communication. (3 cr; SP—Jour major or minor, 3004, #, Δ, A-F only)
Topics specified in *Class Schedule*.

Jour 5993. Directed Study. (1-6 cr [max 6 cr]; SP—Jour major or minor, 3004, Δ, □, #, B avg; A-F only)
Directed study; projects.

Kinesiology (Kin)

School of Kinesiology and Leisure Studies

College of Education and Human Development

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 1889. Health and Society. (2 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. (4 cr; A-F only)
Overview of fitness and health as a function of disease risk, nutrition, stress management, weight control, exercise, illicit drugs, nutraceuticals, and well-being. Base of action and knowledge needed for surviving school, maximizing performance, and living a healthier life.

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. Biomechanical and Task Analysis. (3 cr; QP—3111, CBN 1027, CEHD student or #; SP—3111, CBN 1027, CEHD student or #; §3111; A-F only)
Introduction to the basic theories of biomechanics with the understanding of mechanical principles as it applies to human movement. Analytical methods of examining human motion including quantitative and qualitative approaches.

Kin 3113. First Responder for Coaches and Athletic Trainers. (3 cr; SP—§Kin 3112; A-F only)
Emergency medicine course for coaches and athletic trainers taught by a multidisciplinary faculty of health care professionals. Emphasis on critical thinking skills in emergency settings. Topics: patient assessment, airway management, CPR, splinting, spinal immobilization. Certifications: AHA-BLS, First Responder.

Kin 3114. Prevention and Care of Athletic Injuries. (3 cr; QP—3110, CBN 1027, CEHD student or #; SP—3111, CBN 1027, CEHD student or #; A-F only)
Provides knowledge base in athletic training for prevention and care of injury for future trainers and provides exposure to principles for majors in other fields. Lab offers taping and bracing techniques for prevention and rehab for future trainers.

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 major 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-cr 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—PE 1174 or #)
Motivation, team building, communication, game strategies, and philosophy. Students should have a good understanding of the sport before enrolling. Lecture, discussion, and 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—Elem ed major; SP—Elem ed 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. (1-4 cr [max 4 cr]; QP—#: SP—#: A-F only)
Student-selected clinical or research experience.

Kin 4385. Exercise Physiology. (3 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; SP—§HumF 5001; 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 equiv YMCA certification is required; SP–If certification as Adapted Aquatic Instructor desired, then current American Red Cross Water Safety Instructor or equiv 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 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 #, Physical Education Licensure; SP–3133 or #, Physical Education Licensure; A-F only)

Developmental aspects of human movement behavior and learning, emphasizing life span change of motor skills.

Kin 5135. Motor Control and Learning. (3 cr; QP–3135 or #; SP–3133 or #)

Focus on the main theoretical ideas and research that have advanced motor control over the 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 Exercise and Physical Performance. (3 cr; QP–FScN 1612 or equiv; SP–FScN 1112 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–Admission to init lic/MEd phys ed program or #; SP–Admission to init lic/MEd phys ed program or #; A-F only)

Trends, issues, and challenges in early childhood and K-12 physical education studied for potential impact on the curriculum. For beginning and experienced teachers.

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 16 cr]; QP–5100 or equiv or #; SP–5103 or equiv or #; 5102)

Observation of and participation in physical education instruction for students with disabilities; discussion of current issues in developmental/adapted physical education and exchange of ideas and problems.

Kin 5328. International and Comparative Sport and Physical Education: The Olympic Games. (3 cr;

QP–Grad student or #; SP–Grad student 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 student or #; SP–3126, grad student 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–\$5460, \$Rec 5460; kin or rec major or grad student; SP–\$Rec 5461; kin or rec major or grad student; 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–\$5510, \$Rec 5510, \$Rec 5511; A-F only)

Critically examine women's involvement in and 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. (3 cr; QP–#;

SP–\$3624; admission to coaching program)

Student coaching experience under the supervision of a mentor coach. Required of candidates for coaching certificate.

Kin 5720. Special Topics in Kinesiology. (1-8 cr [max 8 cr]; SP–Upper div Kin undergrad or grad student or #)

Explores current issues in the broad field and subfields of kinesiology or offers coursework in related areas not normally available through regular curriculum offerings.

Kin 5722. Human Factors Physiology. (3 cr; QP–#; SP–#; A-F only)

In-depth view of concepts, problems, and issues in ergonomic applications to improve human workspace design and operation. Critical evaluation of ergonomic tools and methodologies, practical experience in criticism and redesign, and principles necessary for design of efficient future systems.

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 student/init lic or #; SP–Grad student/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 5801. Legal Aspects of Sport and Recreation. (4 cr; QP–Kin or rec major; SP–\$5860, \$Rec 5801, \$Rec 5860; kin or rec major; A-F only)

Legal issues related to recreation, park, and sport programs and facilities in both public and private sectors.

Kin 5981. Research Methodology in Kinesiology and Leisure Studies. (3 cr; QP–3150 or equiv; SP–\$5980; 3151 or equiv; 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.

Kin 5992. Readings in Kinesiology. (1-9 cr [max 9 cr]; QP–CEHD student, grad student, #; SP–CEHD student, grad student, #; A-F only)

Independent study under tutorial guidance.

Kin 5995. Research Problems in Kinesiology and/or Physical Education. (1-6 cr [max 6 cr]; QP–Grad student or MEd student in kin, Physical Education Licensure, or #;

SP–Grad student or MEd student in kin, Physical Education Licensure, or #; A-F only)

Focus on selected topics in physical activity and human performance.

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 AH 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 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 1101. 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; SP–BED major or #; A-F only)

Introduction to spatial design issues at all scales.

LA 3411. Architectural History to 1750. (3 cr; A-F only)

History of architecture and city planning from antiquity to 1750, as illustrated by major monuments from western and non-western cultures.

LA 3412. Architectural History Since 1750. (3 cr; A-F only)

History of structures, cities, sites, and theories of architecture and urbanism since 1750.

LA 3413. Introduction to Landscape Architectural History. (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 5133. Lake Itasca Landscape Analysis. (1 cr; SP–BED accelerated status or LA grad student or #; A-F only)

Field techniques for site analysis, including vegetation, soil, and landform description are introduced at a one-week session before the start of fall term at the Lake Itasca Forestry and Biological Station.

LA 5201. Making Landscape Spaces and Types. (6 cr; SP–BED accelerated status or LA grad student 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 Ecology. (3 cr; SP–One course in ecology, not for LA majors; LA students take 5203 for landscape ecology)

Relationships among spatial patterns, temporal patterns, and ecological processes in the landscape. Topics include factors affecting landscape pattern, measurement of landscape pattern, material transport through landscapes, effects of landscape pattern on population dynamics, and landscape planning.

LA 5203. Ecological Dimensions of Space Making. (6 cr; QP–5211, 5213, 5202 or concurrent registration and/or one course in ecology or #; SP–5201, 5202 or concurrent registration and/or one course in ecology 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 5204. Landscape Ecology. (3 cr; SP–One course in ecology or #)

Relationships among spatial patterns, temporal patterns and ecological processes in the landscape. Topics include factors affecting landscape pattern, measurement of landscape pattern, material transport through landscapes, effects of landscape pattern on population dynamics, and landscape planning.

LA 5351. AutoCAD I. (3 cr; SP–BED major or LA grad student or #; may not be taken for graduate cr; 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–5351, BED major or LA grad student or #; may not be taken for graduate cr; 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–BED accelerated status or LA grad student 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 student 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 student 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–BED accelerated status or LA grad student 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 BED major or LA grad student or #; SP–BED accelerated status or LA grad student 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 BED major or LA grad student or #; SP–BED accelerated status or LA grad student 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 BED major or LA grad student or #; SP–BED accelerated status or LA grad student 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 BED major or LA grad student or #; SP–BED accelerated status or LA grad student 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 BED major or LA grad student or #; SP–BED accelerated status or LA grad student 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; SP–3413 or #; A-F only)

History of landscape architecture from 1700 to 1950 in the formative period of the profession, particularly in Great Britain, France, and the United States. Exploring an individual's design in relationship to personal values, experiences, and places of influence.

LA 5571. Landscape Construction: Landform Systems and Spatial Performance. (4 cr; SP–BED major or LA grad student 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 and 5212 and one course in plant identification or #; SP–5201 and 5203 and one course in plant identification 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 BED major or LA grad student or #; SP–Jr or sr BED major or LA grad student or #; A-F only)

Current techniques and computer programs, and their application to landscape architecture computing.

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.

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 1111. 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 1112. 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-3114 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 3960. 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-#, 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 from term to term and from year to year.

Lat 5370. Latin Literature: Satire. (3 cr [max 12 cr])
One or more appropriate authors studied each semester.

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 equiv or #)
Literature from 6th to 15th centuries. Authors and genres vary; topics specified in *Class Schedule*.

Lat 5621. Latin Palaeography. (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 for Global 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 3401. 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 3402. 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 3502. 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 4121. 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. (4 cr; SP-§Pol 4479; Pol 1054 or Pol 3051 or non-pol sci grad student 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. Videotape 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. Videotape 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 social 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 3011. Honors Introduction to Linguistics. (4 cr; QP-§3001, §3001H, §3005, §5001; linguistics honors candidate or #; SP-§3001, §5001; linguistics honors candidate or #)
Phonetics, phonology, morphology, syntax, semantics, and historical-comparative linguistics; language learning and psychology of language; linguistic universals; language in society.

Ling 3051. 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 3052. Honors Thesis. (3 cr; QP-3051H; SP-3051)
Supervised research, writing, and revision for honors thesis begun in 3051.

Ling 3101. 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 4901. 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 student or #; SP-§3001, §3011; grad student 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-5751 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 at each offering; see *Class Schedule* for specific topics.

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; QP-45 cr, CSOM student; SP-30 cr, CSOM student; A-F only)

A contemporary introduction to issues related to the purpose of business; the impact of changing technologies and demographics; critical skills for successful business careers; researching contemporary business enterprises; exploring career options and resources.

Mgmt 3001. Fundamentals of Management. (2 cr; QP-§8001; SP-§8001; A-F only)

Introduction to organizational analysis and behavior, the structure and functioning of complex organizations; leadership and management for establishing goals, policies, procedures, and plans;

topics covered include motivation, culture, organizational design, group dynamics, performance appraisal, and 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 4004. Business Policy: Strategy Formulation and Implementation. (4 cr; QP-135 cr, completion of business core courses; SP-90 cr, 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 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; A-F only)

Application of theories and research on how new organizational programs, products, and technologies are developed and implemented and what paths in these journeys lead to success and failure; diagnostic skills and useful principles in how innovation journey unfolds in wide variety of instances.

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.

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 3102 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 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 interrelationships 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 2001. Introduction to the Science of Engineering Materials. (3-4 cr; QP-Second yr IT; no cr for MatS majors; SP-Second yr IT; no cr 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 the Science of Materials. (3 cr; QP-Phys 1253, Math 3252, Math 3261 or #, upper div IT or grad student; SP-Phys 1302 or #, upper div IT or grad student, Math 2243, Math 2263)
Builds progressively from electrons to atoms to bonding to crystal structures. Defects, X-ray diffraction, phase diagrams, and microstructure as a basis for understanding mechanical properties and electrical properties; specific materials covered include metals, polymers, ceramics, semiconductors and composites.

MatS 3012. Introduction to Mechanical Behavior of Materials. (4 cr; QP-MatS 3400, 5011; SP-Completion of MatS 3011 with C or better)
Structure of crystalline materials, defects (including point defects, dislocation, and grain boundaries), the role of crystallography and defects in determining mechanical properties. Characterization of crystal structure and defects (using X-ray diffraction and TEM), behavior of defects during mechanical testing.

MatS 4001. Introduction to Thermodynamics of Materials. (3 cr; QP-Chem 5534, Math 3261; SP-Upper div IT, Math 2243, Math 2263)
Fundamental thermodynamic concepts, 1st, 2nd and 3rd Laws, behavior of gases, liquids and solids, phase diagrams, reaction equilibria involving gases and condensed phases, use of computer-based thermodynamic program(s), electrochemistry.

MatS 4002. Mass Transport and Kinetics. (3 cr; QP-5101, upper div IT or grad student; SP-Upper div IT, Math 2243, Math 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. Introduction to Electrical and Magnetic Properties of Materials. (3 cr; QP-5011, upper div IT or grad student; SP-Grade of C or better in 3011 or #, upper div IT or grad student)
Electronic and magnetic properties of solids. Simple band theory of solids. Free electron theory of conductivity and transport. Optical and dielectric response functions. Elementary theory of magnetism. Electronic devices. Superconductivity. Computer-based problems to illustrate applications.

MatS 4212. Introduction to Ceramic Materials. (3 cr; QP-5011, 5101, 5102; SP-Grade of C or better in 3011)
Structure of ceramics: crystal structures, non-crystalline (glass) structures, microstructure. Ceramic phase relationships: binary and ternary diagrams. Ceramic properties: thermal, mechanical, electrical, magnetic, optical. Computer applications will be included.

MatS 4214. Polymer Physical Properties. (3 cr; QP-5011, 3400; SP-Grade of C or better in 3011 or #)
Polymer structure-property relations: structure and morphology of the crystalline and amorphous state. Crystallization kinetics, vitrification and the glass transition, mechanical properties, failure, permeability, optical and electrical properties, polymer composites, effect of processing on properties.

MatS 4221. Materials Design and Performance. (4 cr; QP-5012; SP-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 4301. Materials Processing. (4 cr; QP-5112, 5610 or 5630; SP-4212, 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-Sr mat sci major; SP-Sr 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 4511. Corrosion and Electrochemistry of Corrosion. (4 cr; QP-5011, 5101, upper div IT or grad student; SP-3011 or #, upper div IT or grad student)
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 credit by arrangement with professor. Design credit 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 credit by arrangement with professor. Design credit 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 credit by arrangement with professor. Design credit available if arranged with professor. May be used for upper division Honors Program experience if arranged with professor.

MatS 5521. Thin Films and Interfaces. (3 cr; QP–5013, upper div IT or grad student; SP–MatS 4013, IT upper div or grad student, 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–5011, upper div IT or grad student; SP–3011 or #, upper div IT or grad student)

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, placement exam or minimum grade of C- in GC 0731; SP–3 yrs high school math, placement exam or minimum grade of C- in GC 0731)

Topics indicating breadth of mathematics, its applications, and nature and power of abstract reasoning. Not a prerequisite for any other mathematics course.

Math 1031. College Algebra and Probability. (3 cr; QP–\$1051, \$1111, \$1151, \$1155, \$1201; 3 yrs high school math, placement exam or minimum grade of C- in GC 0731; SP–\$1051, \$1111, \$1151, \$1155, \$1201; 3 yrs high school math, placement exam or minimum grade of C- in GC 0731)

Algebra and analytic geometry explored in greater depth than is usually done in three years of high school mathematics. Additional topics from combinations, permutations, and probability. A suitable prerequisite for 1131 or 1142, but not for 1271.

Math 1051. Precalculus I. (3 cr; QP–\$1031, \$1111, \$1201, \$1008, \$1151; 3 yrs high school math, placement exam or minimum grade of C- in GC 0731; SP–\$1031, \$1111, \$1201, \$1008, \$1151; 3 yrs high school math, placement exam or minimum grade of C- in GC 0731)

Algebra, analytic geometry, and trigonometry beyond the usual coverage found in a three-year high school mathematics program. First of two courses (see 1151). Prepares students for the full calculus sequence. Not an acceptable prerequisite for 1131.

Math 1131. Finite Mathematics. (3 cr; QP–3 1/2 yrs high school math or minimum grade of C- 1031 or 1111; SP–3 1/2 yrs high school math or minimum grade of C- 1031 or 1111)

For students in prebusiness and social and behavioral sciences. Financial mathematics, probability, linear algebra, linear programming, Markov chains, some elementary computer programming.

Math 1142. Short Calculus. (3 cr; QP–\$1211, \$1251, \$1351, \$1551; 3 1/2 yrs high school math or minimum grade of C- in 1031; SP–\$1271, \$1371, \$1571; 3 1/2 yrs high school math or minimum grade of C- in 1031)

For students requiring a minimal amount of calculus. Derivatives, integrals, differential equations, maxima and minima, partial differentiation, applications.

Math 1151. Precalculus II. (3 cr; QP–\$1008, \$1111, \$1201; 3 1/2 yrs high school math, placement exam or minimum grade of C- in 1051; SP–3 1/2 yrs high school math, placement exam or minimum grade of C- in 1051)

Algebra, analytic geometry, and trigonometry beyond the usual coverage found in a three-year high school mathematics program. Second of two courses (see 1051). Prepares students for the full calculus sequence. Not an acceptable prerequisite for 1131.

Math 1155. Intensive Precalculus. (5 cr; QP–\$1031, \$1111, \$1201, \$1008, \$1051, \$1151; 3 yrs of high school math, placement exam or minimum grade of C- in GC 0731)

Intensive study of algebra, analytic geometry, and trigonometry beyond the usual coverage found in a three-year high school mathematics program. Equivalent to 1051 plus 1151. Prepares student for full calculus sequence. Not an acceptable prerequisite for 1131.

Math 1257. Bridging Course: One Variable Calculus. (1.33 cr; QP–1251)

This is a special course, offered only in fall 1999, for students who have completed Math 1251 and intend to take Math 1272.

Math 1261. Transition Calculus III. (2.67 cr; QP–1252)

This is a special transition course, offered only in fall 1999, for students who have completed Math 1252 and need to finish the quarter-based freshman math sequence.

Math 1271. Calculus I. (4 cr; QP–\$1142, \$1211, \$1251, \$1351, \$1551; 4 yrs high school math including trig, placement test or minimum grade of C- in 1151; SP–\$1142, \$1371, \$1571; 4 yrs high school math including trig, placement test or minimum grade of C- in 1151 or 1155)

First of a two-course sequence (1271-1272). Differential and integral calculus of one variable, including elementary differential equations and Taylor Polynomials (but not infinite series); vector geometry and analysis of two and three dimensions, including parametrized curves; partial derivatives; some numerical approximation.

Math 1272. Calculus II. (4 cr; QP–\$1261, \$1353, \$1552; 1252 or equiv with minimum grade of C-; SP–\$1372, \$1572; 1271 or equiv with minimum grade of C-)

Second of a two-course sequence (1271-1272). Differential and integral calculus of one variable, including elementary differential equations and Taylor Polynomials (but not infinite series); vector geometry and analysis of two and three dimensions, including parametrized curves; partial derivatives; some numerical approximation.

Math 1371. Calculus: Concepts, Explorations, and Applications I. (4 cr; QP–\$1251, \$1551; background in precalculus and geometry and visualization of functions and graphs, #, familiarity with graphing calculators recommended, minimum grade of C- required to continue; SP–\$1271, \$1571; background in precalculus and geometry and visualization of functions and graphs, #, familiarity with graphing calculators recommended, minimum grade of C- required to continue)

First-year, single variable calculus with graphic, numeric, and analytical emphasis. Reformulated approach to calculus includes cooperative learning/small groups, labs, projects, technologies, applications, and interdisciplinary modules. Topics: functions, derivatives, integrals, antiderivatives, integration, improper integrals, and differentiation.

Math 1372. Calculus: Concepts, Explorations, and Applications II. (4 cr; QP–Δ; SP–\$1272; minimum grade of C- in 1371)

First-year, single-variable calculus with graphic, numeric, and analytical emphasis. Topics: polar coordinates and curves; infinite, power, Maclauran, and Taylor series; parametric curves, vector value functions; arc length and curvature; first order differential equations, basic linear algebra.

Math 1471. Calculus I for Secondary Students. (4 cr; QP–#, Δ; SP–#, Δ)

Accelerated honors sequence for selected mathematically talented high school students. Emphasis on concepts and explorations. Essentially the same as 1371.

Math 1472. Calculus II for Secondary Students. (4 cr; SP–1471)

Accelerated honors sequence for selected mathematically talented high school students. Emphasis on concepts and explorations. Essentially the same as 1372.

Math 1571. Honors Calculus I. (5 cr; QP–\$1271, \$1371; consent of IT honors office, minimum grade of C- to continue; SP–\$1271, \$1371; consent of IT honors office, minimum grade of C- to continue)

Emphasis on problem solving rather than theory. Differential and integral calculus with an introduction to infinite series.

Math 1572. Honors Calculus II. (5 cr; QP–Δ; SP–Minimum grade of C- in 1571, some parts of this sequence may be taken for cr by students who have taken non-honors calc classes, IT Honors Office approval) Continuation of 1571. Infinite series; calculus of several variables, including vector analysis.

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–1261 or equiv; SP–1272 or equiv)

Linear algebra, with emphasis on eigenvalues; differential equations, including linear differential equations with constant coefficients, solved using eigenvalues; Series solutions and numerical methods for linear and nonlinear differential equations and systems.

Math 2263. Multivariable Calculus. (4 cr; QP–1261 or equiv; SP–\$2373, \$2573; 1272 or equiv)

The derivative as a linear map and the determinant as a measure of area change; differential and integral calculus of functions of several variables, including change of coordinates using Jacobians; line and surface integrals; Gauss, Green, Stokes Theorems; applications. Linear algebra developed as needed.

Math 2283. Sequences, Series, and Foundations. (3 cr; QP–1261 or equiv; SP–1272 or equiv)

Elements of logic; mathematical induction; the real number system; general, monotone, and recursively defined sequences; convergence of infinite series and sequences; Taylor's series; power series with applications to differential equations; Newton's method.

Math 2373. Calculus: Concepts, Explorations, and Applications III. (4 cr; QP–1353 or background in one-variable calculus and geometry and visualization of functions and graphs, minimum grade of C- to continue, familiarity with graphing calculator recommended; SP–\$2243, \$2573; 1372 or background in one-variable calculus and geometry and visualization of functions and graphs, minimum grade of C- to continue, familiarity with graphing calculator recommended)

Multivariable calculus and an introduction to numerical analysis using a geometric, technological, and applied emphasis. Topics: functions, parameterization of curves/surfaces, vector analysis, differentiation, differential equations, linear systems, and linear algebra.

Math 2374. Calculus: Concepts, Explorations, and Applications IV. (4 cr; QP-Δ; SP-§2263; minimum grade of C- in 2373)

Multivariable calculus and introduction to numerical analysis using geometric, technological, and applied emphasis. Topics: integration, integration on curves and surfaces, theorems of Green, Gauss, and Stokes, and numerical analysis (theory and numerical solution of linear equations, numerical solution of nonlinear equations, curve fitting and approximation theory, and numerical solution of ordinary differential equations).

Math 2473. Calculus III for Secondary Students. (4 cr; SP-1472)

Accelerated honors sequence for selected mathematically talented high school students. Emphasis on concepts and explorations. Essentially the same as 2373.

Math 2474. Calculus IV for Secondary Students. (4 cr; SP-2473)

Accelerated honors sequence for selected mathematically talented high school students. Emphasis on concepts and explorations. Essentially the same 2374.

Math 2573. Honors Calculus III. (5 cr; SP-1572, some parts of this sequence may be taken for cr by students who have taken non-honors calc classes, approval of IT Honors office required)

Honors-level treatment of calculus. Topics: more on vector analysis; linear algebra and differential equations.

Math 3113. Topics in Elementary Mathematics I. (4 cr; QP-Minimum grade of C- in 1031 or equiv, minimum grade of C- to continue; SP-Minimum grade of C- in 1031 or equiv, minimum grade of C- to continue)

First in two-course sequence (3113-3118). Emphases on arithmetic and geometric sequences, counting building on the counting techniques studied in college algebra. Graph theory using some of the counting techniques learned earlier in course, integers and rational numbers with an emphasis on aspects related to prime factorization, modular arithmetic with application.

Math 3118. Topics in Elementary Mathematics II. (4 cr; QP-Minimum grade of C- in 3113, #; SP-Minimum grade of C- in 3113, #)

Second in two-course sequence (3113-3118). Probability and statistics building on previously learned methods, vector geometry, real and complex numbers. Finite fields building on previously learned modular arithmetic, geometrical symmetry, and trees.

Math 3252. Transition Multivariable Integral Calculus. (2.67 cr; QP-3251)

Special transition course, offered only in fall 1999, for students who have completed Math 3251 and need to finish the quarter-based sophomore math sequence.

Math 3552H. Transition Honors Analysis III. (2.67 cr; QP-3551H)

Special transition course, offered only in fall 1999, for students who have completed Math 3551H and need to finish the quarter-based sophomore honors sequence.

Math 3574. Honors Mathematics IV. (4 cr; QP-Δ; SP-§5583; 2573 or equiv, consent of IT Honors office)

Differentiation of complex valued-functions of a complex variable; major theorems on analytic functions; power series, Laurent series, other topics in sequences and series.

Math 4065. Theory of Interest. (3 cr; QP-1252 or equiv; SP-1272 or equiv)

Time value of money. Annuities, sinking funds, bonds, and similar items. Primarily for mathematics and business majors interested in actuarial science.

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, Gödel's completeness theorem, axiom systems, and models of formal theories.

Math 4242. Applied Linear Algebra. (4 cr; QP-3261 or equiv; SP-2243 or equiv)

Systems of linear equations, vector spaces, subspaces, bases, linear transformations, matrices, determinants, eigenvalues, canonical forms, quadratic forms, applications.

Math 4337. Computational Methods in Elementary Geometry. (1-3 cr; QP-3251 or equiv or #; SP-2263 or equiv or #)

For preservice and in-service high school math teachers, as well as undergrad math majors planning a career in secondary education. Modern technological aids for teaching high school geometry.

Math 4428. Mathematical Modeling. (4 cr; QP-3261 or equiv; SP-2243 or equiv)

Mathematical models for describing behavior of systems. Modeling of deterministic and probabilistic and continuous and discrete processes. Optimization methods for determining optimal operating parameters.

Math 4457. Methods of Applied Mathematics I. (4 cr; QP-3251, 3261 or equiv; SP-2243, 2263 or equiv)

First in two-course sequence. Modern analytic tools used in applications of mathematics; emphasis on technique. Linear algebra, ordinary and partial differential equations, calculus of variations. Fourier series, complex variables, optimization.

Math 4458. Methods of Applied Mathematics II. (4 cr; QP-#; SP-4457)

Second in two-course sequence. Modern analytic tools used in applications of mathematics; emphasis on technique. Linear algebra, ordinary and partial differential equations, calculus of variations. Fourier series, complex variables, optimization.

Math 4512. Differential Equations with Applications. (3 cr; QP-3261 or equiv; SP-2243 or equiv)

Laplace transforms, series solutions, systems, numerical methods, plane autonomous systems, stability.

Math 4567. Introduction to Fourier Analysis. (4 cr; QP-3261; SP-2243)

Fourier series, integral and transform. Convergence. Fourier series and transform in complex form. Solution of wave, heat, and Laplace equations by separation of variables, Sturm-Liouville systems, finite Fourier and fast Fourier transform. Applications. Other topics as time permits.

Math 4606. Advanced Calculus. (4 cr; QP-3252, §3262; SP-2263, §2283)

Axioms for the real number system. Techniques of proof for limit theorems, continuity, uniform convergence. Rigorous treatment of differential and integral calculus theorems.

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 5xxx probability or statistics course; SP-4065, one sem 4xxx probability or statistics course)

First in two-course sequence. Survival function; actuarial notation; actuarial present value for life insurance and life annuities; equivalence principle; net premiums and reserves; multiple life functions and decrement models; valuation of pensions; expense modeling; modified reserves; other topics at instructor's discretion.

Math 5068. Actuarial Mathematics II. (4 cr; QP-#; SP-5067)

Second in two-course sequence. Survival function; actuarial notation; actuarial present value for life insurance and life annuities; equivalence principle; net premiums and reserves; multiple life functions and decrement models; valuation of pensions; expense modeling; modified reserves; other topics at instructor's discretion.

Math 5165. Mathematical Logic I. (4 cr; QP-Some familiarity with proofs [3262 or Phil 5201 or CSci course in theory of algorithms]; SP-Some familiarity with proofs [2283 or Phil 5201 or CSci course in theory of algorithms])

First in two-course sequence. 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)

Second in two-course sequence. First-order logic: provability and truth in formal systems, models of axiom systems, Gödel's completeness theorem. Gödel'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 5285. Honors: Fundamental Structures of Algebra I. (4 cr; QP-Soph sequence; SP-2243, §2283)

First in two-course sequence (5285-5286). Theory course, primarily for students planning mathematics graduate work. Group theory: normal subgroups; Lagrange, Cayley, and Sylow theorems. Ring theory: ideals, integral domains, Euclidean rings, polynomial rings, fields. Linear algebra: abstract approach to vector spaces, linear transformations; canonical forms.

Math 5286. Honors: Fundamental Structures of Algebra II. (4 cr; QP-#; SP-5285)

Second in two-course sequence (5285-5286). Theory course, primarily for students planning mathematics graduate work. Group theory: normal subgroups; Lagrange, Cayley, and Sylow theorems. Ring theory: ideals, integral domains, Euclidean rings, polynomial rings, fields. Linear algebra: abstract approach to vector spaces, linear transformations; canonical forms.

Math 5335. Geometry I. (4 cr; QP-3251 or 3261; SP-2243 or 2263)

First in two-course sequence. Advanced Euclidean geometry; axiomatic and analytic hyperbolic geometry; projective geometry; symmetry and geometric transformations and their connection to linear algebra, group theory, and complex arithmetic; finite geometries; convex geometric figures.

Math 5336. Geometry II. (4 cr; SP-5335)

Second in two-course sequence. Advanced Euclidean geometry; axiomatic and analytic hyperbolic geometry; projective geometry; symmetry and geometric transformations and their connection to linear algebra, group theory, and complex arithmetic; finite geometries; convex geometric figures.

Math 5345. Introduction to Topology. (4 cr; QP–Soph sequence or #; SP–2263, ¶2283)
Set theory; Euclidean and metric spaces; basics of general topology, including compactness and connectedness.

Math 5378. Differential Geometry. (4 cr; QP–3252, 3262 or equiv; SP–2263, ¶2283)
Basic geometry of curves in the plane and in space, including Frenet formulas; theory of surfaces; differential forms and Riemannian geometry.

Math 5385. Introduction to Computational Algebraic Geometry. (4 cr; QP–3251 or equiv; SP–2263 or equiv)
Geometry of curves and surfaces defined by polynomial equations. Emphasis on concrete computations with polynomials using computer packages and on the interplay between algebra and geometry. Abstract algebra presented as needed; no algebra prerequisite.

Math 5467. Introduction to the Mathematics of Wavelets. (3 cr; QP–3261 or #; SP–2243 or #)
Background theory and experience in wavelets. Inner product spaces, operator theory, and Fourier transforms applied to Gabor transforms, multi-scale analysis, discrete wavelets, and self-similarity. Computing techniques.

Math 5481. Mathematics of Industrial Problems I. (4 cr; QP–Two yrs calc, familiarity with some programming language, #; SP–2243, 2263, familiarity with some programming language, #)
Industrial problems such as crystal precipitation, air quality modeling, color film developing, electron beam lithography. Theoretical foundations and computational methods involving ordinary and partial differential equations, calculus of variations, and numerical analysis.

Math 5482. Mathematics of Industrial Problems II. (4 cr; QP–2 yrs calc, familiarity with some programming language, #; SP–2243, 2263, familiarity with some programming language, #)
Industrial problems such as crystal precipitation, air quality modeling, color film developing, electron beam lithography. Theoretical foundations and computational methods involving ordinary and partial differential equations, calculus of variations, and numerical analysis.

Math 5485. Introduction to Numerical Methods I. (4 cr; QP–3261 or equiv, some computer skills recommended; SP–2243 or equiv, some computer skills recommended)
First in two-course sequence. Solution of linear and nonlinear systems of equations. Interpolation and approximation by polynomials. Methods for eigenvalue problems. Numerical integration. Numerical solution of ordinary and partial differential equations.

Math 5486. Introduction to Numerical Methods II. (4 cr; SP–5485)
Second in two-course sequence. Solution of linear and nonlinear systems of equations. Interpolation and approximation by polynomials. Methods for eigenvalue problems. Numerical integration. Numerical solution of ordinary and partial differential equations.

Math 5487. Computational Methods for Differential and Integral Equations in Engineering and Science I. (4 cr; QP–5242; SP–4242)
First in two-course sequence. Numerical methods for the partial differential and integral equations of engineering and science. Methods include finite element, finite difference, spectral, and boundary integral. Applications to fluid flow, elasticity, and electromagnetism. Recommended for engineering and science graduate students.

Math 5488. Computational Methods for Differential and Integral Equations in Engineering and Science II. (4 cr; QP–#; SP–5487)
Second in two-course sequence. Numerical methods for the partial differential and integral equations of engineering and science. Methods include finite element, finite difference, spectral, and boundary integral. Applications to fluid flow, elasticity, and electromagnetism. Recommended for engineering and science graduate students.

Math 5525. Introduction to Ordinary Differential Equations. (4 cr; QP–3261, 3262; SP–2243, ¶2283)
Ordinary differential equations, solution of linear systems, qualitative and numerical methods for nonlinear systems. Linear algebra background, fundamental matrix solutions, variation of parameters, existence and uniqueness theorems, phase space, rest points and their stability, periodic orbits, Poincaré-Bendixson theory and strange attractors.

Math 5535. Dynamical Systems and Chaos. (4 cr; QP–3252, 3261; SP–2243, 2263)
Dynamical systems theory emphasizing iteration of one-dimensional mappings. Fixed points, periodic points, stability, bifurcations, symbolic dynamics, chaos, fractals, Julia and Mandelbrot sets.

Math 5583. Complex Analysis. (4 cr; QP–\$5553; 3252 or equiv; SP–\$3574; 2263 or equiv)
Algebra, geometry of complex numbers. Linear fractional transformations. Conformal mappings. Holomorphic functions of one variable. Abel's theorem, Cauchy's theorem, power series expansions. Schwarz' lemma. Complex exponential and trigonometric functions. Entire functions, Liouville's theorem. Morera's theorem. Reflection principle. Singularities, Laurent series. Residues.

Math 5587. Elementary Partial Differential Equations. (4 cr; QP–3252, 3261; SP–2243, 2263)
First order equations and method of characteristics. Classification of second order equations: elliptic, parabolic, hyperbolic. Laplace and Helmholtz equations. Heat equation. Wave equation. Separation of variables and eigenfunction expansions. Maximum principle. Applications in physics and engineering.

Math 5615. Honors: Introduction to Analysis I. (4 cr; QP–3252, 3262 or equiv; SP–2243, 2263, ¶2283)
First in two-course sequence. Theory, construction, and models of the real numbers. Elements of topology. Theory and practice of differentiation and integration. Sequences and series of functions, and uniform convergence. Additional topics at instructor's discretion.

Math 5616. Honors: Introduction to Analysis II. (4 cr; QP–#; SP–5615)
Second in two-course sequence. Theory, construction, and models of the real numbers. Elements of topology. Theory and practice of differentiation and integration. Sequences and series of functions, and uniform convergence. Additional topics at instructor's discretion.

Math 5651. Basic Theory of Probability and Statistics. (4 cr; QP–3252; SP–\$Stat 5101; 2263)
Same as Stat 5101. Logical development of probability and some basic issues in statistics. Probability spaces, random variables and their distributions and expected values, law of large numbers and central limit theorem, generating functions, sampling, sufficiency, and estimation.

Math 5652. Introduction to Stochastic Processes. (4 cr; QP–#; SP–2243, 5651 or Stat 5101)
Random walks, Markov chains, branching processes, martingales, queuing theory, Brownian motion.

Math 5654. Prediction and Filtering. (4 cr; QP–#; SP–2243, 5651 or Stat 5101)
Stationary sequences and Markov chains. Prediction of future values, estimation of past values in the presence of noise.

Math 5705. Combinatorics A. (4 cr; QP–One soph math course, some linear algebra recommended; SP–2243 or 2263)
Basic enumeration, inclusion-exclusion, recurrence relations, generating functions (ordinary and exponential), elementary asymptotics, partitions, trees, listing algorithms, algorithmic matchings, bijections and involutions, Polya theory. Optional topics include extremal set theory, symmetric functions, and partially ordered sets.

Math 5707. Combinatorics B. (4 cr; QP–One soph math course, some linear algebra recommended; SP–2243 or 2263)
Combinatorics A is not a prerequisite. Elementary graph theory, including related algorithms, flows and networks, matching theory, and combinatorial optimization. Optional topics include designs, Latin squares, permanents, linear programming, Ramsey theory, coding theory and finite fields, and matroids.

Math 5711. Linear Programming and Combinatorial Optimization. (4 cr; QP–Linear algebra; SP–2243 or equiv)
Simplex method; connections to geometry; duality theory; sensitivity analysis; applications to cutting stock, allocation of resources, and scheduling problems; flows; matching and transportation problems; spanning trees, distance in graphs; integer programs; branch and bound; cutting planes; heuristics; applications to traveling salesman and knapsack problems.

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, Δ; 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 student; 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-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 4054. 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 4055. Extended Design Project. (4 cr; QP-ME upper div, 5254; SP-4054, #; A-F only)
Continuation of ME 4054 for students wishing to undertake a more substantial design project for an entire year. Permission granted when student takes ME 4054 and commits to undertake a two-semester design project. Meets with 4054.

ME 4081. 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 4082. 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 4131. Thermal Environmental Engineering Laboratory. (4 cr; QP-ME upper div, 3701, 3702, 5603 or #; 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 4331. 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 4431. 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. (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.

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 student, 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 student, 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 student, 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 student, 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 kinetoelastodynamic analysis and synthesis of mechanisms. Computerized design for function, path, and motion generation based on Burmeister theory.

ME 5247. Stress Analysis, Sensing, and Transducers. (4 cr; 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 equiv; SP-Upper div IT or grad student, 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 student, 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 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, SBMEEn 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 4010. Introduction to Clinical Laboratory Science. (1 cr; SP–Enrollment in MedT program; S-N only)
Basic clinical lab techniques—centrifuges, analytical balances, photometry, microscopy, pipetting, calculations, and quality control. Blood collection, specimen handling, and safety.

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 4080. Seminar: Specialty Rotations. (1 cr; SP–Enrollment in MedT program; S-N only)
Presentations describing each lab offering a specialty rotation. For seniors planning their clinical rotations.

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 4084. Applied Clinical Virology. (1 cr; SP–4100, 4102; S-N only)
Application of basic methods and techniques in the clinical virology laboratory.

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.

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.

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.

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.

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.

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 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—1yr 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—1 yr work in some area of Middle Ages, reading knowledge of appropriate language, #)
Directed study with one of the core faculty of the Medieval Studies Program.

Microbial Engineering (MicE)

Graduate School

MicE 5309. Biocatalysis and Biodegradation. (3 cr; SP—Chem through organic chem, microbial or advanced chem, knowledge of word processing, 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—\$BioI 5013, \$MicB 5105, \$VPB 3101; soph with C avg in courses prereq to major sequence or jr with 10 cr chemistry, 5 cr biological sciences or #; not for biology majors; SP—\$VPB 2022; Biol 1002 or 1009)

Intended primarily for non-microbiology majors. 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.

MicB 2032. General Microbiology with Laboratory. (4 cr; QP—\$BioI 5013, \$MicB 5105, \$VPB 3101; soph with C avg in courses prereq to major sequence or jr with 10 cr chemistry, 5 cr biological sciences or #; not for biology majors; SP—\$BioI 2032, \$BioI 3301, \$MicB 3301, \$VPB 2032; Biol 1002 or Biol 1009, Chem 1022)
Intended primarily for non-microbiology majors. 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. Includes laboratory.

MicB 3301. Biology of Microorganisms. (5 cr; QP—\$BioI 5013, \$MicB 3103, \$VPB 3103; Biol 5001 or BioC 3021 or BioC 5331 or #; SP—\$BioI 2033, \$BioI 3301, \$MicB 2032, \$VPB 2032; Biol 1002 or 1009, Chem 2302; A-F only)
Taxonomy, anatomy, physiology, biochemistry, pathogenesis, immunology, ecology of microbes. Molecular structure in relation to bacterial function and disease. Includes laboratory.

MicB 4001. Microorganisms and Disease. (2 cr; QP—\$MicB 5233; 10 cr chemistry, 5 cr biological sciences or #; not open to microbiology majors; does not count toward the 16 upper div cr in the biology major; SP—4 cr biol sci, 7 cr chemistry or #, not open to microbiology majors; does not count toward 11 upper div cr in the biology majors; A-F only)
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 and one of the following: Biol 5004 or Biol 5013 or MicB 5105; SP—Biol 4003 and one of the following: 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; SP—Biol/MicB 3301 or equiv; Biol/BioC 3021 or BioC 4331 and GCB 3022 or Biol 4003 recommended; not open to med students)
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 and cultivation of a wide variety of bacteria. Physiological experiments on selected groups.

MicB 4235. Advanced Laboratory: Virology, Immunology and Microbial Genetics. (3 cr; QP—\$BioI 5125; 5218 or \$5218, 5232 or \$5232, 5424 or \$5424, BioC 3021 or BioC 5331 or Biol 5001, GCB 3022 or Biol 5003; SP—Biol/BioC 3021 or equiv, Biol/MicB 3301, and 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 4993. Directed Studies. (1-7 cr [max 7 cr]; QP—#, Δ, S-N only; 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 maximum of MicB 4993 and/or 4994 may count toward major; 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, and 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 Firdowski 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 Farukhzad 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 & Athletics

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 1310)

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-Enrollment in advanced course and associated military science course)

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–Δ)

Modern Greek (MdGk)

*Department of Classical and Near Eastern Studies
College of Liberal Arts*

MdGk 1001. Beginning Modern Greek I. (4 cr)

Speaking and reading demotic Greek. Pattern-practice drill, simple readings, some grammar.

MdGk 1002. Beginning Modern Greek II. (4 cr; 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 3020. 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. Issues of Loss, Grief, and Bereavement. (3 cr; SP–Working understanding of grief and loss; A-F only)

Study of issues related to loss, grief, bereavement, and traumatology. Examination of complicated bereavement and traumatology, complicated vs. non-complicated loss. Treatment methods currently being used.

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 3062. Embalming II. (3 cr; QP–Mortuary science major; SP–Mortuary science major; A-F only)

Theory and procedure of embalming.

Mort 3091. 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; A-F 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; A-F 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 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 1801. 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. Worldwide 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. Worldwide distribution of musical creativity with audio and video documentation.

Mus 3001. 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. (4 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 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 Melodie. (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 3601. 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 3602. 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 3603. 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.

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 student; 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 student; 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 student 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 student 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 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 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]; 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 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 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 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 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 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, Iznaola, Dodgson, and Brindle.

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 student 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 student 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 student 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 student, #; 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–3501 or 3502; A-F only)

Theory and analysis of tonal music using principles developed by Heinrich Schenker. Basic concepts, notation, and their application to excerpts and short pieces from the 18th and 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; A-F only)

In-depth survey of electroacoustic music repertoire from tape and analog music through computer-generated compositions. Basic principles of acoustics, electronic sound generation and manipulation, and digital signal processing techniques. Intro to programming languages useful 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 digital synthesis and processing topics such as filtering, formant synthesis, reverb 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 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.

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 student 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])

Selected topics in music. Each offering focuses on a single topic. Topics specified in *Class Schedule*.

Mus 5993. Directed Studies. (1-4 cr [max 12 cr]; SP–#, Δ, □; A-F only)

Guided individual reading or study.

Music, Applied (MusA)

School of Music

College of Liberal Arts

MusA 1101. Piano—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1102. Harpsichord—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1103. Organ—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1104. Voice—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1105. Violin—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1106. Viola—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1107. Cello—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1108. Double Bass—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1109. Flute—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1111. Oboe—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1112. Clarinet—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1113. Saxophone—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1114. Bassoon—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1115. French Horn—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1116. Trumpet—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1117. Trombone—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1118. Euphonium—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1119. Tuba—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1121. Percussion—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1122. Harp—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1123. Guitar—Elective. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1301. Piano—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1302. Harpsichord—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1303. Organ—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1304. Voice—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1305. Violin—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1306. Viola—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1307. Cello—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1308. Double Bass—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1309. Flute—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1311. Oboe—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1312. Clarinet—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1313. Saxophone—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1314. Bassoon—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1315. French Horn—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1316. Trumpet—Major. (2 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1317. Trombone—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1318. Euphonium—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1319. Tuba—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1321. Percussion—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1322. Harp—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1323. Guitar—Major. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 1401. Piano—Secondary. (2-4 cr [max 16 cr]; SP–Music major, Δ; A-F only)

Private instruction.

MusA 1402. Harpsichord—Secondary. (2-4 cr [max 16 cr]; SP–Audition, Δ; A-F only)

Private instruction.

MusA 5418. Baritone—Secondary. (2-4 cr [max 24 cr];
QP–Audition, Δ; SP–Audition, Δ; A-F only)
Private instruction.

MusA 5419. Tuba—Secondary. (2-4 cr [max 24 cr];
QP–Audition, Δ; SP–Audition, Δ; A-F only)
Private instruction.

MusA 5421. Percussion—Secondary. (2-4 cr [max 24
cr]; QP–Audition, Δ; SP–Audition, Δ; A-F only)
Private instruction.

MusA 5422. Harp—Secondary. (2-4 cr [max 24 cr];
QP–Audition, Δ; SP–Audition, Δ; A-F only)
Private instruction.

MusA 5423. Guitar—Secondary. (2-4 cr [max 24 cr];
QP–Audition, Δ; SP–Audition, Δ; A-F only)
Private instruction.

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-sociophysiological 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 student)

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)

Selected topics in music education. Each offering focuses on a single topic.

MuEd 5991. Independent Study. (1-4 cr [max 8 cr]; SP–Music ed or music therapy major or grad student, #, Δ: A-F only)
Independent study project organized by the student in consultation with the appropriate instructor.

Natural Resources and Environmental Studies (NRES)

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 1041. 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; 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. (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 NRES 5001.

NRES 3002. Colloquium: Exotic Plants and Animals. (1 cr; A-F only)

Lectures from experts; readings and discussion of current issues in exotic plants and animals. Meets with NRES 5002.

NRES 3003. Honors Colloquium. (1 cr; SP–Fr or soph, CNR honors regis, #: A-F only)

Lectures from experts; readings and discussion of current environmental topics/issues.

NRES 3011. Ethics, Conflict, and Leadership in Resource Management. (3 cr)

Readings and discussion of normative ethics and leadership considerations applicable to the management of natural resources and our natural environment.

NRES 3021. Plant Resource Management and the Environment. (3 cr; QP–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; QP–#: 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 3061. 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 3202. Planning and Leadership in Natural Resource Management. (3 cr; A-F only)

Study of the theory and practice of leadership, personal effectiveness, and approaches to planning in natural resource and environmental organizations. Readings, case studies, discussions, and lectures.

NRES 3205. Field Ecology in NRES. (4 cr; QP–Biol 1009 or Biol 1201, Biol 3008 or EEB 3001 or FR 3104 or equiv; SP–Biol 1009 or Biol 1011, Biol 3407 or EEB 3001 or FR 3104 or equiv)

Field introduction to upland terrestrial, wetland, and aquatic habitats of northern Minnesota, their ecological processes, and aspects of management. Identification of common plants, animals, and soils. Application of field techniques. Field-oriented group problem solving.

NRES 3241. Natural Resource Policy and Administration. (3 cr; QP–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; QP–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 3261. Economics and Natural Resources Management. (3 cr; QP–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 3293. 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 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 4101. Conservation of Plant Biodiversity. (3 cr; A-F only)

Social and biological principles underlying the conservation of plant biodiversity at the individual, population, and community levels. Management and policy alternatives for maintaining biodiversity.

NRES 4195. Problem Solving in Natural Resources and Environmental Studies. (4 cr; QP–5210, all Rhet courses, 8 cr in area of concentration for NRES sr majors; 5245, FR 5130, FR 5232 for RRM sr majors; SP–4211, all required core courses, 8 cr in area of concentration for NRES sr majors; 3245, FR 4181, FR 4232 for RRM sr majors; A-F only)

Opportunity to apply tools and skills obtained in classes on policy, planning, and managerial situations. Students will work with a “real world” client to produce a publishable technical report.

NRES 4200. Honors Seminar. (1 cr; QP–NRES honors student; SP–NRES upper div honors program; A-F only)
Lectures and discussions on current topics presented by faculty, students, and guest speakers.

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, measurement, and modeling in the study of natural resources and environmental issues. Emphasis on survey design, data collection, analysis of data, and model development and use. Methods encompass both ecological and economic interests.

NRES 4295. 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 4801. Honors Research. (2 cr; QP–NRES honors student; SP–NRES upper div honors program; A-F only)

First semester of an independent research project supervised by a faculty member.

NRES 4802. Honors Research. (2 cr; QP–NRES honors student; SP–NRES upper div honors program; A-F only)

Students complete honors thesis and present an oral report.

NRES 4811. Natural Resources Interpretation. (3 cr; QP–Jr or sr or grad student ; SP–Jr or sr or grad student; 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; A-F only)

Lectures from experts; readings and discussion of current environmental topics/issues. Topics vary and are announced each semester. Meets with NRES 3000.

NRES 5001. Colloquium: Perspectives on Treaty Rights. (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 NRES 3001.

NRES 5002. Colloquium: Restoration of Aquatic Systems. (1 cr)

Key concepts and techniques in restoration, common factors of restoration projects, and threats to health of aquatic ecosystems.

NRES 5021. Plant Resource Management and the Environment. (3 cr; QP–Grad student; SP–\$3021; grad student)

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 student; SP–Grad student)

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. Environmental Leadership and Ethics. (3 cr; QP–Grad student or #: SP–Grad student or #: A-F only)

Study of philosophy, art, science, and practice of leadership and its relationship to management and

environmental ethics. Leadership models, traits, behaviors, style, and group process. Development of personal leadership philosophy.

NRES 5241. Natural Resource Policy and Administration. (3 cr; QP–ApEc 1101 or Econ 1101, grad student or #; SP–\$3241; ApEc 1101 or Econ 1101, grad student 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 student or #; SP–\$3245; grad student 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 student or #; SP–\$3261; ApEc 1101 or Econ 1101, grad student 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 student or #; SP–\$3575; sr or grad student 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–Biol 1009 or Biol 1011, Chem 1011 or Chem 1021)

Agroforestry practices, what they are, their intended purpose, and production and watershed protection benefits derived from such practices. Role of agroforestry in sustainable development. Agroforestry examples/case studies presented from North America and developing countries.

Naval Science (Nav)

*Department of Naval Science (Naval ROTC)
Student Development & Athletics*

Nav 1000. Professional Training in Naval Science. (1 cr [max 1 cr]; QP–Enrolled in NROTC; SP–Fr 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; SP–#, A-F only)

Historical influences on the development of the U.S. Navy from the American Revolution to the present. Examination of several critical, contemporary issues in naval/maritime affairs.

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; SP–#, A-F only)

Detailed study of ship characteristics and types, including ship design, hydrodynamic forces, stability, compartmentation, propulsion, electrical and auxiliary systems, damage control and administration. Basic concepts of theory and design for steam, gas turbine, diesel, and nuclear propulsion.

Nav 2202. Ship Systems II (Science and Technology in Naval Weapons Systems). (3 cr; SP–#, A-F only)

Processes of detection, evaluation, threat analysis, weapon selection, delivery, guidance, and explosives. Physical aspects of radar and underwater sound. Facets of command, control, and communications are explored as a 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; SP–#, A-F only)

Theory and practical knowledge of how to pilot a ship near land. Coordinate systems, chart reading, dead reckoning, fixes, tides, currents, and anchoring. Theory of navigating based on the observance of celestial bodies.

Nav 3302. Navigation II (Seamanship and Ship Operations). (3 cr; QP–1201, 1202, 1203; SP–3301, #; A-F only)

National and international nautical rules of the road, seamanship, tactical maneuvering and signaling, relative motion, vector-analysis, formation tactics, ship employment, ship behavior and characteristics. Application of the maneuvering board in solving motion problems.

Nav 3310. Evolution of Warfare. (3 cr; SP–#, A-F only)

Great military leaders of history. Traces the development of warfare from the dawn of recorded history to the present, focusing on the impact of major military theorists, strategists, tacticians, and technological developments.

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; SP–#, A-F only)

Advanced level of study of organizational behavior and management. Major behavioral theories are examined in detail. Practical applications are explored using exercises, case studies, and seminar discussions.

Nav 4402. Leadership, Management, and Ethics II. (3 cr; QP–Mgmt 3001; SP–4401 or Mgmt 3001, #; A-F only)

Develops students' understanding of the junior officer role and the myriad of responsibilities faced as a leader, manager, and professional officer of the Naval Services. Continues to develop specific competencies in the areas of leadership, management, professional administration, and development. Emphasis on Naval Service ethics and core values.

Nav 4410. Amphibious Warfare. (3 cr; SP–#, A-F only)

Traces the development of amphibious doctrine and its expansion in the Pacific Campaign of World War II. Detailed case studies of Tarawa, Iwo Jima, and Okinawa give the student an appreciation for the amphibious planning process.

Neuroscience (NSc)

College of Biological Sciences

NSc 3101. Introduction to Neuroscience I: From Molecules to Madness. (3 cr; QP–\$Phsl 3101, \$Biol 3101; BioC 3021 or 5331, Biol 5004 or \$5004; SP–\$Phsl 3101, \$Biol 3101; Biol/BioC 3021 or BioC 4331, Biol 4004 or \$4004)

Basic principles of cellular and molecular neurobiology and nervous systems.

NSc 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.

NSc 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.

NSc 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.

NSc 49993. Advanced Topics in Neuroscience. (3 cr; QP–Biol 3011, Biol/BioC 3021 or #; SP–\$Phsl 4151; Biol/NSc/Phsl 3101 or #; A-F only)

Primarily for undergraduates majoring in neuroscience or related areas. In-depth study of topics such as neurodevelopment, neurochemistry or molecular neuroscience, sensory systems, motor control, and behavioral neuroscience.

NSc 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.

NSc 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.

NSc 5031. 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 student 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 5101. Itasca Summer Neurobiology Laboratory. (2 cr; A-F only)

Concepts in cellular neurosciences in lab environment for advanced undergraduates in the sciences. Basis of membrane properties including ionic and molecular mechanisms of resting, action, and synaptic potentials. State-of-the-art equipment and contemporary techniques used to examine experimental evidence.

Nsc 5111. Human Neuroscience. (4 cr; SP-#, A-F only)

Lecture and laboratory course surveying molecular, cellular, and systems neuroscience.

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-Phs1 5201 or equiv, understanding of UNIX; SP-Phs1/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 student 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 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.

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-3011)

Discussion of novels, short stories, plays, and articles complemented by structural, stylistic, and vocabulary-building exercises.

Nor 4001. Beginning Norwegian. (2 cr; SP-§1001;

passing score on GPT in another language or grad student)

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 student)

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 student)

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 student)

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)

Overview of the nursing profession, including career opportunities and challenges. Survey of contemporary nursing and its historical roots and stages.

Nurs 3690. Life Span, Growth, and Development I.

(2 cr; QP-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; QP-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 4000. Introduction to Public Health. (2 cr; SP-1 yr college-level courses)

Health and risk factors of populations. Principles of epidemiology and environmental health are applied to selected public health issues. Emphasis on the multiple factors that affect health and distribution of health care resources.

Nurs 4100. Introduction to Nursing, Health, and Health Promotion. (5 cr; QP-§15021; SP-4000, ¶14101, ¶14102, ¶14103, ¶14104)

The nature of nursing and nursing practice, and the relationship among their foundational concepts: health, person, and environment. Concepts of health, health assessment, and health promotion for the individual within the context of family and community.

Nurs 4101. Clinical Practicum: Health and Health Promotion.

(2 cr; SP-¶14100, ¶14102, ¶14103, ¶14104; S-N only)

Focus on health promotion/disease prevention. Emphasis on health assessment and strategies for promoting health in individuals across the life span.

Nurs 4102. Foundational Interventions for Nursing.

(2 cr; QP-¶15000, Patho Phys or ¶1, Pharmacology or ¶1; SP-¶14100, ¶14101, ¶14103, ¶14104)

Learn to perform psychomotor skills used in standardized health assessment and selected nursing, complementary, and delegated medical interventions when caring for persons throughout the life span in a variety of contexts.

Nurs 4103. Therapeutic Communication in Health Care.

(3 cr; QP-Admission to Nurs or #; SP-¶14100, ¶14101, ¶14102, ¶14104)

Develop the use of self in the therapeutic nurse-client relationship. Apply the principles of interpersonal communication with clients and other health professionals. Develop interpersonal skills for interaction with clients, families, and communities.

Nurs 4104. Ethical Sensitivity and Reasoning in Health Care.

(2 cr; SP-¶14100, ¶14101, ¶14102, ¶14103 or #)

Develop sensitivity to the range and complexity of ethical issues/dilemmas in health care. Use ethical principles and theories to reason about ethical problems. Examine use of key ethical concepts in 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, 4102, 4103, 4104, ¶14202, ¶14205, ¶14210 or ¶14210, ¶14302, ¶14306)

Nursing care of adults experiencing acute and chronic physiological disruptive events. Emphasis on recognition of response patterns, formulation of goals, selection and application of appropriate interventions, and evaluation of client outcomes.

Nurs 4202. Core Interventions for Nursing Practice. (2 cr; QP–5040; SP–4102, ¶4200, ¶4205, ¶4210 or ¶4205, ¶4300, ¶4310)

Learn to perform the psychomotor skills used in core nursing, complementary, and delegated medical interventions when caring for persons or families, throughout the life span, experiencing health disruptions or 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 4206. Honors Course: Nursing Theory and Research. (3 cr; QP–Nurs honors student; SP–Nurs honors student)

Examine knowledge basic to the discipline and practice of nursing. Relationships among research, theory and practice are analyzed. Research process is introduced with attention to utilization of research in practice. Students develop honors research proposal.

Nurs 4210. Care of Adults with Health Disruptions II: Psychiatric Illnesses. (4 cr; SP–4100, 4101, 4102, 4103, 4104, ¶4200, ¶4202, ¶4205)

Form therapeutic relationships with clients experiencing psychiatric illnesses. Develop skill in collaborating with a multidisciplinary team to assess biopsychosocial needs, develop a 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, 4102, 4103, 4104, ¶4202, ¶4205, ¶4310 or ¶4302, ¶4306, ¶4310)

Content and experience in caring for children and families when children are acutely or chronically ill. Didactic presentations cover situations and conditions common to children. Practice opportunities 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, 4102, 4103, 4104, ¶4202, ¶4205, ¶4300 or ¶4300, ¶4302, ¶4306)

Explores the scope of the nurse's role during the antepartum period, birth experience, and immediate postpartum phase. Emphasis on 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 4405. Honors Course: Applied Research and Research Utilization. (2 cr; QP–Nurs honors student; SP–4206)

Fundamental skills in systematic inquiry, and interpreting and evaluating research for applicability to nursing practice. Implement the study proposed in 4206 and write a scholarly research report to serve as the 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 4407. Honors Course: Seeking Solutions to Global Health Issues. (2 cr; SP–4405 or #)

Global health issues are examined from an interdisciplinary perspective. Emphasis on ethical and cultural sensitivity, and on understanding the complexities of the issues in order to propose realistic actions that could be taken 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 multisystem 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, multisystem problems.

Nurs 4800. Nursing Topics. (1-16 cr [max 16 cr]; QP–#; SP–#)

Exploration of a topic to meet individual student needs.

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 the Health Care of Elders. (3 cr; SP–Grad student or Nurs sr or #)

Survey of common ethical issues in health care that confront elders, their families, health care providers, and the broader 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, # for undergrad; SP–Inferential statistics, grad or professional student, # for undergrad)

Focus on skills needed to properly collect and analyze data using SPSS for Windows. While learning the

basic skills for analysis, statistics are reviewed to ensure appropriate analysis and correct interpretation of output.

Nurs 5200. Holistic Health Assessment and Therapeutics for Advanced Practice Nurses. (3 cr; SP–Admission to advanced practice nursing or #)

Health assessment knowledge and skills for advanced nursing practice with patients across the age span, including pregnancy. Selected nursing interventions and complementary therapies are examined for their application to specific populations and 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 5222. Advanced Physiology. (3 cr; SP–Grad in nurse practitioner or nurse-midwifery, # for undergrad)

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 student 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 student, #; SP–Grad student, #)

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 #)

Advanced concepts in neuroscience, psychopharmacology, and clinical management related to psychopharmacologic treatment of psychiatric disorders and symptoms. Current scientific knowledge of psychopharmacology and its application to problems seen in a variety of clinical settings.

Nurs 5300. Health Behavior Intervention: Theory and Application. (3 cr; SP–Grad student 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 student 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-One cultural anth course, Nurs undergrad or grad student or RN; SP-One 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.

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; QP- Math 1111 or equiv, 30 cr completed; SP-Math 1111 or equiv, 20 cr completed; A-F only)

Business statistics concepts/methods for applying: exploratory data analysis, basic inferential procedures, statistical process control, regression analysis, experimental design, and time series. Objectives are to improve students' "statistical thinking abilities" and their managerial decision making and problem solving capabilities.

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 5170. Simulation Modeling and Analysis. (4 cr; SP-BA 1550 or MBA 6120 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 non-majors 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 non-majors 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 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 5462. Neuropsychopharmacology of Abused

Drugs. (3 cr; SP-§Nsc 5208; Phcl 6112, Psy 5062 or #)

Principles of pharmacology and methodologies currently used to study relationships between drugs and biochemical, behavioral, and neurophysiological

variables. Functional biogenic amine, peptidergic and other pathways; and theories of tolerance to 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-§5201)

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-§1002)

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, physiology, patho-

physiology of disease states, third-yr phar; A-F only) Interdisciplinary course which will encompass the pharmacology, clinical indications, drug interactions of the most commonly used products today in nontraditional complementary health care. Explore the historical significance as well as evidenced-based role of these products in health care today. Case studies help students 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)

Philosophy (Phil)

Department of Philosophy

College of Liberal Arts

Phil 1001. Introduction to Logic. (4 cr)

Application of formal techniques for evaluating arguments.

Phil 1002. Introduction to Philosophy. (4 cr)

Problems, methods and schools of philosophy; historical and contemporary.

Phil 1003. Introduction to Ethics. (4 cr)

Central concepts and principal theories of moral philosophy.

Phil 1004. Introduction to Political Philosophy. (4 cr)

Central concepts and principal theories of political philosophy.

Phil 1005. Scientific Reasoning. (4 cr)

Techniques for understanding and evaluating scientific information as presented in the popular media and in more specialized publications. Emphasis on general reasoning skills that do not require extensive training in particular sciences.

Phil 1006. 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 1011. Honors Course: Introduction to Logic. (4 cr)
Application of formal techniques for evaluating arguments.

Phil 1012. Honors Course: Introduction to Philosophy. (4 cr)

Problems, methods, and schools of philosophy; historical and contemporary.

Phil 3001. General History of Western Philosophy: Ancient Period. (4 cr)

Major developments in ancient Greek philosophic thought: pre-Socrates, Socrates, Plato, Aristotle, Hellenistic thinkers.

Phil 3005. General History of Western Philosophy: Modern Period. (4 cr)

Major developments in philosophic thought of the modern period: renaissance beginnings, Descartes through Kant.

Phil 3231. Philosophy and Language. (4 cr)

Philosophical issues concerning the nature and use of human language.

Phil 3234. 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 3302. Moral Problems of Contemporary Society. (4 cr)

Selected moral problems of private and public life.

Phil 3304. Law and Morality. (4 cr)

A study of the relationship among law, morality, and our role as citizens.

Phil 3305. Medical Ethics. (4 cr)

Moral problems confronting physicians, patients, and others concerned with medical treatment, research, and public health policy. Topics include abortion, living wills, euthanasia, genetic engineering, informed consent, proxy decision-making, and allocation of medical resources.

Phil 3307. 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 3308. 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 3311. Introduction to Ethical Theory. (4 cr)

Nature and justification of moral judgments and moral principles; analysis of representative moral views.

Phil 3502. Introduction to Aesthetics. (4 cr)

Development of aesthetic theories with applications to specific aesthetic problems.

Phil 3601. 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 3607. 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 3900. Honors Seminar. (3 cr; SP—honors regis, 6 cr of 3xxx-5xxx philosophy courses)

Topics of contemporary interest varying from semester to semester.

Phil 3910. 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)

A survey of several major figures of the medieval Christian synthesis, e.g., Augustine, Anselm, Aquinas, Scotus, Ockham.

Phil 4004. 19th-Century Philosophy. (3 cr)

A survey of several major figures from the 19th century, e.g., Hegel, Schopenhauer, Mill, Kierkegaard, Marx, Nietzsche.

Phil 4008. Survey of Contemporary Philosophy. (3 cr; SP—3005 or #)

A survey of major figures in contemporary philosophy, both analytic and phenomenological, e.g., Dewey, Russell, Wittgenstein, Heidegger, Carnap, de Beauvoir.

Phil 4009. Existentialism. (3 cr; SP—3005 or 4004 or #)

Central themes—such as being-in-the-world, freedom, and engagement—of several important existentialist thinkers, e.g., Kierkegaard, Jaspers, Sartre, de Beauvoir, Baldwin.

Phil 4010. Selected Ancient Philosopher. (3 cr; SP—3001 or #)

One or more major writings of a 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 #)

A major work of a selected medieval philosopher, e.g., Anselm’s *Proslogion*, Aquinas’s *Summa contra Gentiles, Books I and II*, Nicholas of Cusa’s *On Learned Ignorance*.

Phil 4040. Selected Rationalist. (3 cr; SP—3005 or #)

One or more major writings of a 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 4050. Selected Empiricist. (3 cr; SP—3005 or #)

One or more major writings of a selected empiricist, e.g., Locke’s *Essay Concerning Human Understanding*, Berkeley’s *Principles of Human Knowledge*, Hume’s *Treatise of Human Nature*.

Phil 4055. Kant. (3 cr; SP—3005 or 4004 or #)

A major work, e.g., *Critique of Pure Reason*.

Phil 4070. Selected 19th- or Early to Middle 20th-Century Philosophy. (3 cr; SP—One sem history of philosophy)

Major writings of a 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 4085. Wittgenstein. (3 cr; SP—3005 or 4231 or #)

A major work, e.g., *Philosophical Investigations*.

Phil 4101. Metaphysics. (3 cr; SP—One sem history of philosophy or #)

Philosophical theories concerning the nature of reality.

Phil 4105. Epistemology. (3 cr; SP—1001 or #; A-F only)

Theories of the nature and sources of knowledge and evidence.

Phil 4231. Philosophy of Language. (3 cr; SP—1001, 5201 or #)

Central topics. Theories of reference, linguistic truth, relation of language and thought, translation and synonymy.

Phil 4310. History of Moral Theories. (3 cr; SP—1003 or #)

Issues in western moral philosophy from the classical age to the present day.

Phil 4320. Intensive Study of an Historical Moral Theory. (3 cr; SP—1003 or #)

Intensive consideration of an author or theory in the history of moral or political philosophy.

Phil 4321. Theories of Justice. (3 cr; SP—1003 or 1004 or #)

Philosophical accounts of the concept and principles of justice.

Phil 4324. Ethics and Education. (3 cr; SP—6 cr in philosophy or education or #)

Exploration of central issues in the philosophy of education. What constitutes good education, both in terms of educational outcomes and of processes which promote learning? What connections are there between the concepts of good education and good society?

Phil 4325. Education and Social Change. (6 cr; A-F only)

Exploration of connections between education and social change. Study of theories of democratic or popular education and application of the theories through an in-depth practicum experience in a community education setting. Includes a 4 hour practicum each week.

Phil 4330. Contemporary Moral Theories. (3 cr; SP—1003 or #)

Discussion of the view that evaluative judgments cannot be based on factual considerations alone, and the relation of this view to the objectivity of ethics.

Phil 4414. Political Philosophy. (3 cr; SP—1004 or #)

Survey of historical and contemporary works in political philosophy.

Phil 4501. Principles of Aesthetics. (3 cr; SP—3502 or one other phil course or #)

Examination of major problems arising in attempts to identify, characterize, or evaluate art.

Phil 4510. Philosophy of the Individual Arts. (3 cr; SP—3502)

An examination of aesthetic problems which arise in studying or practicing one of the specific arts.

Phil 4521. Philosophy of Religion. (3 cr; SP—8 cr in Phil)

Analysis of conceptual problems that arise from attempts to provide a rational justification for religious belief.

Phil 4605. Space and Time. (3 cr; SP—Courses in philosophy and/or physics or #)

Philosophical problems concerning the nature and structure of space, time, and space-time.

Phil 4607. Philosophy of the Biological Sciences. (3 cr; SP—Courses in philosophy and/or biology or #)

Philosophical questions that arise in connection with biology: structure and status of evolutionary theory, the nature of molecular biology and genetics, reductionism in biology, legitimacy of teleology, species concept.

Phil 4611. Philosophy of the Social Sciences. (3 cr; SP—9 cr of philosophy and/or social science or #)

Criteria for describing and explaining human actions; problems of objectivity, reduction, freedom.

Phil 4614. Philosophy of Psychology. (3 cr; SP—3607 or Psy 3051, 5011 or #)

Problems and prospects in recent developments in psychology, cognitive science, and philosophy of mind.

Phil 4615. Minds, Bodies, and Machines. (3 cr; SP—One course in philosophy or #)

The mind-body problem and the philosophical relevance of cybernetics, artificial intelligence, and computer simulation.

Phil 4622. Philosophy and Feminist Theory. (3 cr; SP—8 cr in Phil or WoSt or #)

Examines encounters between philosophy and feminism. Gender’s influence in traditional philosophical problems and methods; the social role of the theorist and of theorizing as they relate to the politics of feminism.

Phil 4760. Selected Topics in Philosophy. (3 cr; SP—Three 3xxx-5xxx philosophy courses 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, Gödel, 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)
Attempts to answer the question, "What is logic?" Topics include the scope of logic; disputes about alternative logics; various theories concerning the nature of logical truth (e.g., conventionalism, the 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, Gödel, Quine.

Phil 5325. Biomedical Ethics. (3 cr; SP-# for undergrads) 3302 or social science major or #)
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-Three 3xxx-5xxx courses in philosophy 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)
Fundamentals of diving. Students actively learn proper mechanics and technique to insure safety, while learning new skills. Technical and numerical aspects through lecture and 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 (mat work), 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)
Offensive and defensive strategies and 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)
Intermediate to advanced technical and tactical actions in foil, rudimentary epee skills, and intermediate to advanced footwork. Rules, officiating skills, bout tactical skills.

PE 1135. Intermediate Karate. (1 cr; QP-#, 1035 or equiv; SP-#, 1035 or equiv)
Additional techniques of Japanese Traditional Shotokan Karate taught through Ippon Kumite (one-step sparring), San Kumite (three-step sparring), and Heian Shodan Kata and 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)

Review terminology, rules, etiquette, and improve basic skills. Increased emphasis on singles and doubles strategy and competitive play.

PE 1154. Figure Skating. (1 cr; QP-#: 1053 or equiv; SP-#: 1053 or equiv)

Fundamental skills and techniques of figure skating: terminology, rules; basic moves, jumps, spins. On-ice and off-ice assignments.

PE 1157. Intermediate Skiing. (1 cr; QP-#: 1057 or equiv; SP-#: 1057 or equiv)

Development of advanced skills in alpine skiing, including skiing safely on more difficult terrain. Class held at Highland Hills ski area in Bloomington. An assessment of ability will be made to determine skill level.

PE 1165. Intermediate Tumbling. (1 cr; QP-#: 1065 or equiv; SP-#: 1065 or equiv)

Expansion of basic tumbling skills, including rolls, handstands, cartwheels, extensions, handsprings, tucks (flips), twisting, and combinations, accompanied by the appropriate 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)

Diving equipment, physics, physiology, decompression, emergencies, recreational dive planning, oceans, currents and aquatic life, snorkeling and SCUBA equipment usage, buoyancy control, entries, and emergencies. Course meets two of three requirements for open water SCUBA certification.

PE 1306. Lifeguard Training. (1 cr; QP-#: proficient ability to swim 500 meters; SP-#: proficient ability to swim 500 meters)

Upon completion, certifications will be obtained in the following categories: American Red Cross Lifeguarding Today and First Aid, CPR for the Professional Rescuer, and Waterfront Lifeguarding. For anyone age 17 and older with a moderate to high swimming ability.

PE 1411. Water Safety Instructor. (2 cr; QP-#: proficient ability for basic strokes, successful completion of skill and written pre tests; SP-#: proficient ability for basic strokes, successful completion of skill and written pre tests)

Advanced lifesaving techniques and treading strategies.

PE 1415. Advanced Olympic Lifting and Conditioning. (1 cr; QP-#: 1014, 1015 or equiv; SP-#: 1014, 1015 or equiv)

For experienced Olympic lifters with a desire for cardiovascular excellence. A variety of Olympic and traditional lifts with emphasis on 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 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 II. (4 cr; SP-Regis PT student; A-F only)

Second 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 5287. Neurorehabilitation I. (4 cr [max 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 [max 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)

PMed 5295. Clinical Education. (12 cr; SP-Regis third-yr 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. (3 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. (3 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 and techniques applied to patient populations with both mental health and physical disabilities. Treatment planning and 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)

Critical thinking model applied to assessment of and intervention related to selected patient populations with mental and physical problems requiring specialized approaches. Focus on habilitation and rehabilitation of populations with multiple performance deficits.

PMed 5344. Neurorehabilitation: Evaluation and Intervention IV. (5 cr; QP-5343 or #: SP-5343 or #: A-F only)

Assessment and intervention related to perception, cognition, reflexes, sensory integration, and motor control. Application to individuals with multiple performance 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. (2 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 and family influences on individual health and decision making. Students identify current trends in health care and determine responses to them at the 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 and materials for patient/family education, peer/professional education, and education of others to carry out therapeutic interventions. Student teaching unit and 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)

Principles of administering and managing occupational therapy services within a managed care environment. Medicare, HMOs, TQM, consultation, human resources, promotion of the profession. Emphasis on 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, and work-related injuries/industrial rehabilitation. Fieldwork experience.

PMed 5392. Research in Occupational Therapy. (3 cr; QP-5370 or #: SP-5313 or #: A-F only)

Analyze scientific literature and develop 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 dissections. 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 1001. The Physical World—Energy and its Impact on the Environment. (4 cr; QP—One yr high school algebra; SP—One yr high school algebra)
Fundamental principles governing the physical world discussed in the context of energy and the environment. Includes laboratory.

Phys 1101. Fundamental 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. The fundamental principles of physics in the context of the everyday world. The use of kinematics and dynamics principles together with quantitative and qualitative problem solving techniques to understand natural phenomena. Lecture, recitation, and lab.

Phys 1102. Fundamental Physics II. (4 cr; QP-1041; SP-1101)
Primarily for students interested in technical areas. A continuation of 1101, emphasizing the fundamental principles of physics in the context of the everyday world. Use of conservation principles together with quantitative and qualitative problem solving techniques to understand natural phenomena. Lecture, recitation, and lab.

Phys 1201. General Physics I. (5 cr; QP—High school or college calculus, trigonometry, algebra; SP—High school or college calculus, trigonometry, algebra)
Fundamental principles of physics primarily for pre-med and biological science students. Description of motion, forces, conservation principles, and the structure of matter with applications to mechanical systems including fluids, waves, and heat. Includes lab.

Phys 1202. General Physics II. (5 cr; QP-1104, 1105; SP-1201)

Second semester of the sequence emphasizing fundamental principles of physics primarily for pre-med and biological science students. Description of motion, forces, conservation principles, and the structure of matter with applications to electromagnetic phenomena including optics and atomic structure. Includes lab.

Phys 1301. Introductory Physics I. (4 cr; QP—Math 1252 or Math 1352 or Math 1552H; SP—Phys 1401; Math 1271 or Math 1371 or Math 1571)

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 1302. Introductory Physics II. (4 cr; QP-1252, Math 1261 or Math 1353 or Math 1553H; SP-1402; 1301, Math 1272 or Math 1372 or Math 1572)

Second semester of calculus-level general physics course emphasizing use of fundamental principles to solve quantitative problems. Description of motion, forces, conservation principles, fields, and the structure of matter with applications to electromagnetic phenomena.

Phys 1401. 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 1402. 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-3254, Math 3261 or equiv; SP-1302 or 1402, Math 2243 or Math 2373 or Math 2573)
Introduction to thermodynamics and its underlying statistical nature.

Phys 2303. Introductory Physics III. (4 cr; QP-1253 or 1453, Math 3261 or equiv; SP-Phys 2403; 1302, Math 2243 or Math 2373 or Math 2573)

Third semester of calculus-level general physics 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 20th-century physics such as classical and quantum mechanical waves, optics, special relativity, and the atomic structure of materials.

Phys 2403. 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 3071. 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 3940. 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.

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 4052. 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–SHSci 5924; general physics or #; SP–SHSci 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–SHSci 5925; general physics or #; SP–SHSci 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–SEE 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 nonspecialists 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. Topics include detection and identification of those particles, their interactions with matter and magnetic fields in space, and their 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, ¶4411)
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 4940. Senior Honors Seminar. (1 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–4001 or equiv)
Schrödinger 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 student 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 student or grad physics minor; SP–Gen physics, #; no cr for physics grad student 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 physics, calculus; SP–General physics, calculus)
Forces on the musculoskeletal system; circulatory system and membrane transport; biological control systems; propagation and action potential in the nervous system; biomagnetism and electromagnetism at the cellular level.

Phys 5402. Radiological Physics. (4 cr; QP–General physics, calculus; SP–General physics, calculus)
Signal analysis, medical imaging, medical X-rays, tomography, radiation therapy, nuclear medicine, MRI, and similar topics.

Phys 5701. Solid State Physics for Engineers and Scientists. (4 cr; QP–1254, 3512, grad student or adv undergrads in physics or engineering or the sciences or #; SP–Grad student or adv undergrads 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 student or adv undergrad in physics, Δ; SP–Grad student or adv undergrad in physics, Δ)

Phys 5980. Introduction to Research Seminar. (1 cr [max 3 cr]; QP–Grad student or upper div phys major; SP–Grad student 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–1 yr college biol, 1 yr college chem)

For pre-allied health sciences majors. How major organ systems function (nerve, muscle, circulation, respiration, endocrine, renal, gastrointestinal, temperature regulation and energy metabolism). Fall offering emphasizes independent learning using e-mail extensively for information exchange between students and faculty. One-hour lecture, two-hour lab.

Phsl 3061. Principles of Physiology. (4 cr; SP–1 yr college chem and physics and math through integral calculus)

Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, gastrointestinal, renal, endocrine, muscle, peripheral and central nervous systems), cellular transport processes, and scaling in biology.

Phsl 3071. Principles of Physiology for Majors. (5 cr; SP–Physiology major; 1 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 ¶Biol 5004; SP–\$Biol 3101, \$NSc 3101; Biol/BioC 3021 or BioC 4331, Biol 4004 or ¶Biol 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 sensory and motor aspects of behavior.

Phsl 3105. Neurobiology Laboratory I. (1.5 cr; QP–\$Biol 3105, \$NSc 3105; 3101 or ¶3101, Biol 3101 or ¶Biol 3101, NSc 3101 or ¶NSc 3101; SP–\$Biol 3105, \$NSc 3105; 3101 or ¶3101, Biol 3101 or ¶Biol 3101, NSc 3101 or ¶NSc 3101; A-F only) Principles, methods, and lab exercises for investigating neural mechanisms and examining experimental evidence.

Phsl 3115. Neurobiology Laboratory II. (1.5 cr; QP–\$Biol 3115, \$NSc 3115; 3102 or ¶3102, Biol 3102 or ¶Biol 3102, NSc 3102 or ¶NSc 3102; SP–\$Biol 3115, \$NSc 3115; 3102 or ¶3102, Biol 3102 or ¶Biol 3102, NSc 3102 or ¶NSc 3102; A-F only) Principles, methods, and lab exercises for investigating neural mechanisms and examining experimental evidence.

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–¶Phsl 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 4151. Research Topics in Neuroscience. (3 cr; QP–\$Biol 5150, \$NSc 5150; Biol 3011, Biol/BioC 3021 or #; SP–\$NSc 4151; Biol/NSc/Phsl 3101 or #; A-F only) Primarily for undergraduates majoring in neuroscience or physiology. In-depth study of specific topics from genetics to physiology to behavior, such as aspects of neurodevelopment, neurochemistry or molecular neuroscience, sensory systems, motor control, and behavioral neuroscience.

Phsl 5094. Research in Physiology. (1-5 cr [max 20 cr]; QP–Physiology undergrad major, Phsl 3055, Phsl 3056, #; SP–Physiology undergrad major, Phsl 3071, #) Independent lab research project in physiology, supervised by physiology faculty.

Phsl 5095. Problems in Physiology. (1-5 cr [max 20 cr]; QP–Physiology undergrad major, Phsl 3055, Phsl 3056, #; SP–Physiology undergrad major, Phsl 3071, #) Individualized study in physiology. Students address a selected problem in physiology 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 neural 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–\$BioC 5444, \$MdBc 5444, \$VPB 5444; 3052 or BioC 3021 or BioC 5331 or #; SP–\$BioC 5444, \$MdBc 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.

Phsl 5461. Cellular and Molecular Neuroscience. (4 cr; QP–#, SP–#) Cellular and molecular approach to studying the nervous system. Lectures by a team of faculty, problem sets designed to teach physiological concepts, and discussion of original research papers. Required for first-year neuroscience students and appropriate for graduate students.

Plant Biology (PBio)

Department of Plant Biology College of Biological Sciences

PBio 1212. Plants and Society. (3 cr) 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–Biol 2022 or Biol 3007) Systematics of the flowering plants of the world. Ecology, geography, origins, and evolution of flowering plants; family characteristics; floral structure, function, and evolution; pollination biology; methods of phylogenetic reconstruction; molecular evolution; taxonomic terms; methods of collection and identification.

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 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 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.

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, ¶GCB 5034; SP–\$PBio 5414; Biol 3002, Biol 4003, GCB 5034 or ¶GCB 5034) Selected topics in plant molecular biology for students with a strong interest in the subject. Classical and recent papers that have led to current understanding of transposable elements, genomic structure and function, mechanisms of hormone action and gene regulation.

PBio 5960. Special Topics. (1-3 cr [max 6 cr]; 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. (1 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) Turfgrass diseases, insect and nematode problems, the role of turfgrass ecology in disease development. Tools to diagnose turfgrass diseases and provide recommended strategies for diseases. Safe and effective pesticide strategies and integrated pest management plans for management.

PIPa 2001. Introductory Plant Pathology for Horticulturists. (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 phys-chemical stresses have on incidence and severity of plant disease, and examples of how techniques of plant disease control may be integrated.

PIPa 2002. Diseases of Field Crops. (3 cr; QP–Biol 1009 or equiv; SP–Biol 1009 or equiv) Dynamics of plant pathogens and their control in plant disease. Crops discussed are found in common rotations practiced in Minnesota, i.e., small grain, corn, soybeans, potatoes, sugar beets, and dry beans.

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. Evaluative reports and consultations with faculty advisers and employers.

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 and methodology in the quantitative study of plant disease epidemics and host plant resistance. Disease assessment, analysis of disease in time and space, models for epidemic progress, environmental influences on epidemic development, crop loss assessment, disease forecasting, and ecology of host-parasite interactions, as well as development of plant disease management strategies.

PIPa 5103. Physiological and Molecular Plant-Microbe Interactions. (3 cr)

Physiology and molecular biology of plant-microbe interactions. Communication between plants and microbes, signal transduction, control of gene expression, symbiosis and 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 5301. Plant Genomics. (3 cr; QP–Intro genetics course or #; SP–Intro genetics course or #)

Introduction to genomics with emphasis on plants and relevant model organisms. Topics include DNA marker and sequencing technology, comparative genomics, whole genome sequencing, DNA chips and microarrays, EST libraries and SAGE analysis, gene-knockout systems, genome databases, sequence comparison and 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 1002. Honors Course: American Democracy in a Changing World. (4 cr; SP–\$1001; honors student)

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 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 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 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-#, Δ)
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)
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 3109. Honors Course: Researching Politics.** (3 cr; SP-Pol honors major; A-F only)
Seminar meets each spring to give students a solid start on their honor theses. Research design, methods of data collection, and analysis and strategies for scholarly writing. Intended for juniors in political science who have been admitted to CLA honors.
- Pol 3110. Honors Thesis Cr.** (1-4 cr [max 4 cr]; SP-3109, Pol honors major; A-F only)
Individual research and 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 3235. 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. Civil Liberties in America.** (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 3352. Fieldwork in the Legislature.** (3-4 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 3451. 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 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 3872. Global Environmental Cooperation.** (3-4 cr; SP-\$5872)
Emergence of the environment as a key aspect of the global political agenda. Nongovernmental and governmental international organizations. Politics of protection of the atmosphere, rain forest, seas, and other selected issues. International security and the environment.
- Pol 3873. 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 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.
- 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)
Origin and development of U.S. congressional institutions, parties, committees, leaders, lobbying and elections, and relations between Congress and executive branch. Relationship between campaigning and governing, the nature of representation, and the 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 4315. 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 4461. European Government and Politics. (4 cr; SP-Pol 1054 or 3051 or non-pol science grad 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 student 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 student 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 student 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 student 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. (4 cr; SP-SLAS 4479; 1054 or 3051 or non-pol sci grad student 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 student 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)
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 Development I. (3 cr; SP-1001 or 1002 or non-pol sci grad major or equiv or #)
Historical and analytical approaches to examine the Court's landmark decisions, exploring theory and techniques of judicial review, and relating the Court's authority to the wider political and social context of American government.

Pol 4502. The Supreme Court and Constitutional Development II. (3 cr; SP-1001 or 1002 or equiv or non-pol sci grad major or #)
Examining the Supreme Court's interpretation of the Bill of Rights and the 14th amendment, this course focuses on freedom of speech, press and religion, crime and punishment, segregation, desegregation and affirmative action, abortion and 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 student)
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 student 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 student or #)
Seminar discussions and class simulations examine the rise and role of inter-governmental organizations such as the United Nations and nongovernmental 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 student or #)
Study the politics of international trade and monetary affairs including north-south and east-west relations

Pol 4970. Individual Reading and Research. (1-3 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. Politics of Environmental Protection. (3 cr; SP-§3441; non-pol sci grad student or #)
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 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. Nongovernmental 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
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 or # for speakers of other Romance languages)
Study of Portuguese based on student knowledge of Spanish. Contrastive approach to Portuguese phonic and morpho-syntactic structures.

Port 3003. Portuguese Conversation and Composition. (4 cr; SP-1104 or 3001)
Improvement of all four language skills (speaking, comprehension, reading, and writing). Readings and discussions on Brazil, Portugal, and/or Lusophone Africa.

Port 3501. Foundations of Lusophone Cultures. (3 cr; SP-§3401; 3003)
Introduction to Portuguese culture. Literature, history, film, and popular music. Historical, political, and cultural development of Portugal from 1400s until late twentieth century.

Port 3502. Foundations of Brazilian Culture. (3 cr; SP-§3402; 3003 or equiv)
Emphasis on modern Brazilian society. History, culture (music, art, cinema, literature, intellectual trends, popular culture, media), and social issues (ethnicity, tropical deforestation).

Port 3503. Literatures and Cultures of Lusophone Africa. (3 cr; SP-§3403; #)
Origins and development of Lusophone Africa (Angola, Cape-Verde, Guinea-Bissau, Mozambique, and São Tomé and Príncipe) using literature, cultural and literary criticism, history, anthropology, and various media (film, art, music, Internet). Main cultural problematics pertaining to Lusophone Africa as well as its fundamental literary texts.

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). Taught in English.

Port 3910. Topics in Lusophone Literatures. (3 cr [max 9 cr]; SP-3501 or 3502 or 3503)
Critical reading of Lusophone literary texts (Brazil, Portugal, Lusophone Africa) representing various genres (novel, short story, poetry). Terminology of criticism, literary problems, and 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 century to present) 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 century to present) 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 trends, critical theory, popular culture. Topics may 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 issues (e.g., Machado de Assis, Fernando Pessoa, Clarice Lispector, José Saramago). 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 issues, 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 (Lusophone 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)

CLA Premajor Advising Program
College of Liberal Arts

PMA 1005. Orientation to the Health Sciences. (2 cr; A-F only)
Designed for first- and second-year students exploring majors and careers in the health sciences. Learn about academic and professional options through class discussion, textbook readings, experimental activities, self-assessment exercises, and presentations by health care professionals.

PMA 1050. The Premajor Freshman Seminar. (2 cr; SP-Must be enrolled in the Faculty Mentor Program; A-F only)
Discussions led by faculty mentors on liberal education, the nature of university life, major exploration, and study skills appropriate to various disciplines. Students entering CLA as freshmen who will be assigned to the Premajor Advising Program are eligible to participate in the PMA Faculty Mentor Program.

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)
Introduction to the scientific study of human behavior and a prerequisite for all advanced courses in Psychology. Introduces the problems, methods and findings of modern psychology to beginning students.

Psy 3005. 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; SP-§5061; 3005 or Biol 1009 or #)
Basic neurophysiology and neuroanatomy, neural mechanisms of motivation, emotion, sleep-wakefulness cycle, and learning and memory in animals and humans. Neural basis of abnormal behavior and 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-3801 or equiv; SP-3005 or equiv)

Differential methods in the study of human behavior. Overview of the nature of psychological traits and the influence of age, sex, heredity, and environment in causation of individual and group differences in ability, personality, interests, and social attitudes.

Psy 3137. Readings in Behavioral Genetics. (1 cr; SP-¶5137; S-N only)

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; SP-1001 and 3005 or #; A-F only)

Theories and research about how culture influences basic psychological processes in domains (e.g., emotion, cognition, psychopathology) that span different areas of psychology (e.g., social, clinical, developmental, industrial-organizational).

Psy 3604. Introduction to Abnormal Psychology. (3 cr; SP-§5604; 1001)

Abnormal psychology. Etiologies of behavioral disorders. Available treatments.

Psy 3617. Introduction to Clinical Psychology. (3 cr; QP-3604 or 5604H, 3801 or equiv; SP-3604 or 5604)

Historical developments and contemporary issues; relevant research and clinical trends in psychological assessment methods, intervention strategies, and clinical psychology research. Theories behind, and 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 3902. Major Project in Psychology. (4 cr; QP-1005, 3801, jr or sr psychology major; SP-3005, jr or sr in psychology; A-F only)

Seminar for completion of the undergraduate major project paper.

Psy 3960. Undergraduate Seminar. (1-5 cr; QP-1001, #; SP-1001, #)

Current topics in psychology. Topics listed in psychology office.

Psy 3993. Directed Studies. (1-8 cr [max 15 cr]; SP-#, Δ, □)

Independent reading leading to written paper or oral or written examination.

Psy 3994. Directed Research. (1-8 cr [max 15 cr]; SP-#, Δ, □)

Individual empirical projects leading to written report.

Psy 3996. Undergraduate Field Study/Internship in Psychology. (1-6 cr [max 6 cr]; 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; SP-3011 or #)

Fundamental concepts of behavioral psychology and practical techniques of behavior modification with humans and animals. Emphasis on functional analyses of behavior deficits or excesses and development and implementation of programs to bring about meaningful behavior change.

Psy 4036. Perceptual Issues in Visual Impairment. (2 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 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 4902. Honors Project. (3-6 cr [max 6 cr]; QP-Sr, #; SP-Psychology honors major)

Critical literature review or empirical study.

Psy 4994. Honors Research Practicum. (4 cr [max 4 cr]; SP-3005, honors psychology major)

Practical experience conducting psychological research and preparation for completion of honors thesis. Instruction in research ethics, practical aspects of conducting psychological research, writing research reports. Assist faculty and advanced graduate students in ongoing research projects.

Psy 4996. Honors Internship/Externship. (1-6 cr; SP-Honors and #; A-F only)

Supervised internship/externship experience in a community-service or industrial setting relevant to formal academic training and objectives.

Psy 5012. Psychology of Conditioning and Learning. (4 cr; SP-3011 or #, except for grads)

Review and evaluation of key questions, methods, theories, and data about classical conditioning, instrumental learning, and elementary cognitive processes. Emphasis on animal models.

Psy 5013. Laboratory in Conditioning and Learning. (4 cr; SP-3005 except grad students, 5012 or #)

Laboratory exercises exploring forms of animal conditioning and learning. A combination of both prepared exercises and 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 or grads; SP-3051 except for honors or grads)

Human cognitive abilities, such as perception, memory, and attention, from different perspectives, e.g., the cognitive psychological approach, emphasizing behavioral/functional research, and the cognitive neuroscience approach, emphasizing a theoretical integration of cognitive, neuroscientific, and computational evidence.

Psy 5031. 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; SP-3031 or 3051 or #)

Applications of psychology, neuroscience, and computer science to understanding the design principles underlying visual perception, visual cognition, and action. Compare biological and physical processing of images with respect to image formation, perceptual organization, object perception, recognition, navigation, and 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 5038. Introduction to Neural Networks. (3 cr; QP-3061 or 5061, Math 3261 or equiv or #; SP-3061 or 5061, Math 3261 or #)

Introduction to parallel distributed processing models in neural and cognitive science. Topics include linear models, Hebbian rules, self-organization, nonlinear networks, optimization, and representation of information. Applications to sensory processing, perception, learning, and memory.

Psy 5051. 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 and grads; SP-3005 or #, except for honors and grads)

Theories and experimental evidence in past and 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 and neuroanatomical mechanisms underlying behavior of animals, including humans. Neural basis of learning and 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 or #)

Consequences of different types of brain damage on human perception and cognition. Neural mechanisms of normal perceptual and cognitive functions. Vision and attention disorders, split brain, language deficits, memory disorders, central planning deficits. Emphasis on function and phenomenology with minimal amount of brain anatomy.

Psy 5101. Personality Psychology. (3 cr; QP-§3101; 5862 or ¶5862, honors or grad student; SP-§3101; 3005, honors or grad student)

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 of 5xxx courses in psychology or equiv or grad student or #; SP-6 cr of 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-3135; 3801 or equiv, 5862 or #; SP-4801 or equiv, 5862 or #)
Differential methods in the study of human behavior. Overview of the nature of psychological traits and the influence of age, sex, heredity, and environment in causation of individual and 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-3135 or 5135, 5862 or #; SP-3005 or equiv)
Theories and findings concerning age-related changes in mental health, personality, cognitive functioning, and productivity. Reviewed and interpreted within the context of the multiple biological, social, and psychological changes that accompany age.

Psy 5202. Attitudes and Social Behavior. (3 cr; QP-3201 or #; SP-3201 or #)
Traditional and current theory and research in social psychology on the psychology of attitudes.

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; SP-3201 or grad student, #)
Applications of social psychology research and theory to such domains as physical and mental health, education, the media, desegregation, the legal system and other institutions, energy conservation, and public policy.

Psy 5206. Social Psychology and Health Behavior. (3 cr; SP-3201 or grad student; A-F only)
Survey of social psychological theory and research pertaining to the processes by which people develop beliefs about health and illness; the relationship between these beliefs and the adoption of health-relevant behavior; and the impact of psychological factors on physical health.

Psy 5207. Personality and Social Behavior. (3 cr; SP-3101 or 3201 or # except for honors and grads; A-F only)
Conceptual and methodological strategies for scientific study of individuals and their social worlds; applications of theory and research to issues of self, identity, and social interaction.

Psy 5501. Vocational Psychology. (3 cr; SP-3801 or #)
Survey of the concepts, theories, methods, and findings of vocational psychology. Topics include history; individual differences; vocational development, device, adjustment; vocational assessment; vocational counseling.

Psy 5604. Abnormal Psychology. (3 cr; SP-\$3604; honors major or # for grads)
Comprehensive review of psychopathological disorders. Etiology, diagnostic criteria, and clinical research findings emphasized.

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; SP-3005 or 4801 or equiv, 3711 or #)
The application of psychological research and theory to issues in personnel recruitment and selection, and measurement of job performance. Apply principles of individual differences and psychological measurement to decision making in organizations (recruitment, selection, and performance appraisal).

Psy 5702. Psychological Foundations of Individual Behavior in Organizations. (3 cr; QP-3801 or equiv, 8 cr psychology or #; SP-3711, 4801 or equiv or #)
Theory and research on human behavior and performance in organizations. Organizational socialization processes across the career span, leadership styles and processes, work team structures and characteristics, problem-solving and decision-making processes, group dynamics, and 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 student or #; SP-4801 or equiv, honors or grad student 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 #)
Advanced topics in classical test theory. Binomial test models. Differential item functioning, test equating. Advanced reliability theory, generalizability theory. Criterion-referenced testing. Item response theory using three-parameter models. Comparisons between classical and item response theory methods.

Psy 5960. Topics in Psychology. (1-4 cr; SP-1001, #)
Special classes or seminars offered infrequently for juniors, seniors, and graduate students. Topics listed in the psychology office.

Public Affairs (PA)

Hubert H. Humphrey Institute of Public Affairs

PA 1961. Leadership, You, and Your University. (3 cr)
For freshmen and sophomores interested in studying/practicing leadership. Introduction to leadership theory, personal development, interpersonal relations, leadership at University of Minnesota. Competencies taught include personal assessment, written/verbal presentation, resume writing, electronic communication, goal setting, coping with group dynamics.

PA 3311. 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 3961. 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 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. (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)
History and institutional development of urban planning as a profession. Roles of urban planners in United States and international settings. Scope, legitimacy, and limitations of planning and planning process. Issues in planning ethics and in planning in settings of diverse populations and 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 publ hlth or adult special student or #) Draws on theories, concepts, and real world examples to explore critical managerial challenges. Governance systems, strategic management practices, impact of different funding environments, management of multiple constituencies. Examines different types of nonprofits using economic and behavioral approaches.

PA 5102. Organization Design and Change. (1.5 cr; SP–Grad or publ hlth or adult special student or #) Introduction to basic concepts related to organizational design decisions and managerial challenges associated with organizational change in the context of public sector agencies and nonprofit organizations. Major forces for change, different kinds of change, and management of change. Uses case-based analysis and discussion.

PA 5111. Financial Management in Public and Nonprofit Organizations. (3 cr; SP–5003, grad or publ hlth or adult special student or #) Design, installation, and use of accounting and control systems in public and nonprofit organizations. Public accounting standards and practices, financial administration and financial reporting, debt management, budgeting, and contract and procurement management systems. Lecture and discussion with case analysis.

PA 5112. Public Budgeting. (4 cr; SP–Grad or publ hlth or adult special student or #) Budget processes in legislative and executive branches of federal, state, and local government; program planning evaluation and administration; techniques of budget and program analysis; use of budget as policy and management tool; analysis of fund flows within and among governments.

PA 5113. State and Local Public Finance. (3 cr; SP–Grad or publ hlth or adult special student or #) Examines theory and practice of financing and providing public services at the state and local levels of government. Emphasis on integrating theory and practice, applying the materials to specific policy areas, and documenting the wide range of institutional arrangements across and within the fifty 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 publ hlth or adult special student or #) Theory and practice of intergovernmental relations in the United States. Historical, political, and economic roots of contemporary institutions. Intergovernmental dimensions of specific policy areas. Policy areas include education, economic development, metropolitan affairs, social welfare, and other areas of student interest.

PA 5122. Law and Public Affairs. (3 cr; SP–Grad or publ hlth or adult special student or #) Public policy making is shaped and constrained by the national, state, and local legal framework in which it occurs. Broad overview of the evolution of the 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 publ hlth or adult special student or #) Nonprofit agencies are becoming the service delivery arm of the government. This course examines nonprofit and public sector financial and development strategies, the political strategies they use to obtain funding, and philanthropy's historical role in public affairs. Includes guest speakers.

PA 5131. Conflict Management: Readings in Theory and Practice. (3 cr; SP–Grad or publ hlth or adult special student or #) Current theory; review of conflict resolution strategies. Various aspects of interpersonal, group, organizational, and systemic conflict.

PA 5190. Topics in Public and Nonprofit Leadership and Management. (3 cr; SP–Grad or publ hlth or adult special student, #) Analysis of selected topics.

PA 5201. American Cities I: Population and Housing. (4 cr; SP–Grad or publ hlth or adult special student or #) 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.

PA 5202. American Cities II: Economy, Land Use, and Transportation. (4 cr; SP–Grad or publ hlth or adult special student or #) Urban economy and its locational requirements; central place theory; transportation and urban land use, patterns and conflicts; industrial and commercial land blight; real estate redevelopment; historic preservation; emphasis on links between land use, transportation policy, economic development, and local fiscal issues; U.S.–Canadian contrasts.

PA 5203. Geographical Perspectives on Planning. (4 cr; SP–Grad or publ hlth or adult special student or #, ¶Geog 3605 or ¶Geog 5605) Open to undergraduate and graduate students wishing honors credits. Includes one additional weekly

seminar-style meeting and a bibliography project on a topic selected in consultation with the instructor.

PA 5211. Introduction to Land Use Planning. (3 cr; SP–Grad or publ hlth or adult special students or #; course in spatial analysis or work experience demonstrating knowledge of field, # for undergrad sr and adult special in UC) Physical and spatial basis for community and regional development; role of public sector in guiding private development processes; issues in design of settlements; applied case studies examining public regulatory frameworks.

PA 5212. Managing Urban Growth and Change. (3 cr; SP–Grad or publ hlth or adult special student or #) Theory and practice of planning, promoting, and controlling economic growth and change in urban areas. Economic development tools available to state and 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 or publ hlth or adult special student or #) Roles of various participants in the land development process; analysis of investment objectives and effects of regulation. Overview of the development process from both private and public perspective.

PA 5231. Transportation Policy and Planning. (3 cr; SP–Grad or publ hlth or adult special student or #) Urban transportation planning and policy-making process, including relationship of transportation to demographics, economic development, land use, and the environment. Transportation system management, demand management, public mass transit systems. Includes field projects in transportation planning.

PA 5241. Environmental Planning. (3 cr; SP–Grad or publ hlth or adult special student or #) Provides basic knowledge and skills for environmental planning practice. Relationship between natural resources, ecology, and urban development, and the planning design principles in balancing these; legal and regulatory context of environmental planning; and methods of environmental impact analysis.

PA 5251. Strategic Planning and Management. (1.5 cr; SP–Grad or publ hlth or adult special student or #) Theory and practice of strategic planning and management for governments, public agencies, and nonprofit organizations. How to promote strategic thinking and acting by policy-making bodies and management teams in order to determine what an organization should do, how it should do it, and why. Lectures and case discussions.

PA 5252. Strategy and Tactics in Project Planning and Management. (1.5 cr; SP–Grad or publ hlth or adult special student or #) Planning, analysis, evaluation, and implementation of short-term plans and projects. Technical analyses and interactional elements of completing projects within budget and time constraints. Appropriate strategic and tactical choices involved in the planning process. Analysis of case examples.

PA 5253. Participatory Management and Public Involvement Strategies. (3 cr; SP–Grad or publ hlth or adult special student or #) Survey of strategies, techniques, and tools for involving members of groups, teams, organizations, and various stakeholders, including the public at large, in problem definition, policy or plan formulation, decision making, and implementation. Emphasis on public and nonprofit organizations and citizen involvement.

PA 5261. Housing Policy. (3 cr; SP–Grad or publ hlth or adult special student or #) Explores institutional and environmental setting for the making of housing policy in the United States. Competing ideas about solving the nation's housing problems through public intervention in the market. Federal and local public sector responses to housing problems.

PA 5290. Topics in Planning. (3 cr; SP–Grad or publ hlth or adult special student, #)
Analysis of selected topics.

PA 5301. Population Methods and Issues for the United States and Third World. (3 cr; SP–Grad or publ hlth or adult special student or #)

Basic demographic measures and methodology. Discussion of readings on population growth and environment; demographic transition; mortality; fertility; diverse perspectives on nonmarital fertility, marriage, divorce, and cohabitation; cultural differences in family structure; aging; migration; refugee movements; population policies.

PA 5311. Program Evaluation. (3 cr; SP–Grad or publ hlth or adult special student or #)

Principal methods and primary applications of evaluation research as applied to policies and programs in health and human services, education, or the environment. Enables students to conduct evaluations and to be more critical consumers of studies done by others.

PA 5390. Topics in Advanced Policy Analysis Methods. (3 cr; SP–Grad or publ hlth or adult special student, #)
Analysis of selected topics.

PA 5401. Poverty, Inequality, and Public Policy. (3 cr; SP–Grad or publ hlth or adult special student or #)

The nature and extent of poverty and inequality in the United States, its causes and consequences, and the impact of government programs and policies. Extent and causes of poverty and inequality in other developed and developing countries.

PA 5411. Child Development and Social Policy. (3 cr; SP–Grad or publ hlth or adult special student or #)

Intersection of conceptual orientations of developmental psychology with policies that affect children and families. Demographic, historical, and social trends that underlie assumptions driving policies directed at women and children; projections of future policies.

PA 5412. Aging and Disability Policy. (3 cr; SP–Grad or publ hlth or adult special student or #)

Policy debates concerning populations that are aging or disabled. Students learn and practice analyses in context of important health, social, and economic policy debates. Readings on current theory and evidence.

PA 5421. Racial Inequality and Public Policy. (3 cr; SP–Grad or publ hlth or adult special student or #)

Seminar explores historical roots of racial inequality in American society; contemporary economic consequences. Provokes open debate and discourse on public policy responses to racial inequality. Emphasis on stimulating participants to think about and analyze critically the range of strategies offered for reducing racism and racial economic inequality.

PA 5431. Labor Policy. (3 cr; SP–5031 or equiv, grad or publ hlth or adult special student or #)

Public policies regarding employment, unions, and other institutions in the labor markets. Public programs affecting wages, unemployment, training, worker mobility, security, and quality of work life. Policy implications of changing nature of work.

PA 5441. Education Policy and the State Legislature. (3 cr; SP–Grad or publ hlth or adult special student or #)

How the Minnesota legislature makes decisions about education issues. (Discussions focus on K-12 issues, but there are many implications for higher education.) How to increase one's influence in this process. Discussions with people influencing statewide educational policy, presentations, and a field trip to the state legislature.

PA 5442. Policy Design for Education and Human Development. (3 cr; SP–Grad or publ hlth or adult special student or #)

Develops skills useful in designing effective educational policies. Practice using interdisciplinary approaches to identify and understand core variables (economic, psychological, etc.) that make the difference between policy success or failure. Opportunity to work on policy design tasks using multiple perspectives.

PA 5490. Topics in Social Policy. (3 cr; SP–Grad or publ hlth or adult special student, #)
Analysis of selected topics.

PA 5501. Economic Development I. (2 cr; SP–Grad or publ hlth or adult special student or #)

Economic development theories and strategies at national and regional levels in developing countries and the United States. Redistributive and basic needs strategies, institutional approaches, dependency and Neo-Marxist approaches, gender and development, sustainable development, effects of globalization on workers and communities, public policy responses.

PA 5502. Economic Development II. (2 cr; QP–5502 or equiv, grad or publ hlth or adult special student or #; SP–5501 or equiv, grad or publ hlth or adult special student or #; A-F only)

Economic development from a macroeconomic and open-economy perspective. Sources of economic growth; agricultural development; import-substitution industrialization; endogenous growth models; population, migration, and human development; policy reform and adjustment.

PA 5511. Community Economic Development.

(3 cr; SP–Grad or publ hlth or adult special student or #)
Contexts and motivations behind community economic development activities; alternative strategies available to communities for organizing and initiating economic development projects; tools and techniques for conducting economic development analysis and planning—market analysis, feasibility studies, development plans; implementation at the local level.

PA 5521. Development Planning and Policy Analysis.

(3 cr; QP–5021 or equiv, 5502 or equiv, grad or publ hlth or adult special student or #; SP–5031 or equiv, 5501 or equiv, grad or publ hlth or adult special student or #)
Techniques and assumptions of development planning and policy analysis at national, regional, and project levels. Direct and indirect effects of external shocks and government interventions on national and regional economies. Macroeconomic modeling, input-output analysis, social accounting matrices and multipliers, project appraisal and evaluation techniques.

PA 5522. Economic Development of Latin America.

(3 cr; QP–5011 or equiv, 5502 or equiv, grad or publ hlth or adult special student or #; SP–5021, 5501 or equiv, grad or publ hlth or adult special student or #)
History of post-World War II period of Latin America beginning with Prebisch Thesis up through policy reforms of 1980s-1990s. Topics relating to privatization, policy reform, and deregulation in Latin America.

PA 5531. Strategies for Sustainable Development: Theory and Practice. (1.5 cr; SP–Microecon course, grad or publ hlth or adult special 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 and developing countries, with emphasis on countries in transition.

PA 5590. Topics in Economic and Community Development. (3 cr; SP–Grad or publ hlth or adult special student, #)

Analysis of selected topics.

PA 5601. Survey of Women, Law, and Public Policy in the United States. (3 cr; SP–Grad or publ hlth or adult special student or #)

Gendered nature of public policy through historical analysis of welfare, single motherhood, and protective legislation. How laws structure public policy and how courts are arenas for policy making. Emphasis on 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 or publ hlth or adult special student or #; SP–5021, grad or publ hlth or adult special student or #)

Feminist philosophy, methodology, and economic practice; feminist perspectives on development and the global economy; feminist perspectives on work and family; heterodox traditions in economics.

PA 5690. Topics in Women and Public Policy. (2-3 cr; SP–Grad or publ hlth or adult special student, #)
Analysis of selected topics.

PA 5701. Science and State. (3 cr; SP–Grad or publ hlth or adult special student or #)

Relationship between science and contemporary society. The nature of science—its ways of knowing, its values, its processes; how science has influenced U.S. political institutions and political and judicial processes; issues in current debate over U.S. science policy.

PA 5711. Science and Technology Policy. (3 cr; SP–Grad or publ hlth or adult special student or #)

Effect of science and technology on global economy, politics, environment, security. Role of national science and technology policies in development, diffusion, and adoption of technologies nationally and internationally. Other issues related to technology, technology policy, technological development, impact of technology, international cooperation.

PA 5721. Energy and Environmental Policy. (3 cr; Grad or publ hlth or adult special student or #)

Impact of energy production and consumption choices on environmental quality, sustainable development, and other economic and social goals. Emphasis on public policy choices for both energy and the environment and the links between them.

PA 5722. Environmental and Resource Economics Policy. (3 cr; SP–Grad or publ hlth or adult special student or #, knowledge of intermediate microeconomics and policy analysis)

Public policy associated with natural resource use and environmental protection. Develops/applies economic concepts/methodologies/policy mechanisms. Principles of environmental and resource economics; issues related to renewable/nonrenewable resources and environmental pollution. Focus on scientific and political aspects of policy.

PA 5790. Topics in Science, Technology, and Environmental Policy. (3 cr; SP–Grad or publ hlth or adult special student, #)

Analysis of selected topics.

PA 5801. U.S. Foreign Policy: Process and Analysis. (3 cr; SP–Grad or publ hlth or adult special student or #)

Examines both U.S. general diplomacy and foreign economic policy with an emphasis on analysis. Broad security strategy; policy towards specific geographic regions; trade, investment, and monetary policy; immigration policy; and environmental cooperation.

PA 5811. Public Policy Problems of Globalization.

(3 cr; SP–Grad or publ hlth or adult special student or #)
Policy problems facing national and subnational decision makers caused by increasing international mobility of goods, services, capital, persons, and ideas.

PA 5812. Open Economy Models: An Assessment.

(3 cr; SP–Grad or publ hlth or adult special student or #, intermediate macroeconomics and trade theory)
Understanding open economics and implications for where policy making and implementation take place. Issues at the international level and from the level of domestic economies.

PA 5890. Topics in Foreign Policy and International Affairs. (3 cr; SP–Grad or publ hlth or adult special student, #)

Analysis of selected topics.

PA 5901. Computer Applications in Public Affairs.

(0.5-3 cr [max 6 cr]; SP–Grad or publ hlth or adult special student or #; S-N only)
Introduction to computer systems and applications as used in public affairs practice.

PA 5921. Application of Mediation Methods. (3 cr; SP–Grad or publ hlth or adult special student or #)

Experience in skills needed to create an arena for mediation and specific skills/expectations needed to mediate a dispute between individuals and among groups, both balanced (peer or colleague) and imbalanced (power differentials exist). Role playing, emphasizing group debriefing and critique. Cases employed.

PA 5922. Conflict Management Proseminar. (1 cr; SP–Grad or publ hlth or adult special student or #) Current topics in conflict management research and practice. Theoretical implications and practical applications of conflict management from the perspectives of each participant. National and international issues.

PA 5923. Conflict Management Proseminar. (1 cr; SP–Grad or publ hlth or adult special student or #) Current topics in conflict management. Theoretical implications and practical applications of conflict management from the perspectives of each participant. National and international issues.

PA 5931. The Role of the Media in Public Affairs. (3 cr; SP–Grad or publ hlth or adult special student or #) Historical and contemporary role of news media in defining and shaping public opinion and public policy, primarily in the United States. Emphasis on critical research and professional skills in three forms of journalism: hard news coverage, investigative reporting, and documentaries. Field experience and practice in governmental public relations.

PA 5941. Leadership for the Common Good. (4 cr; SP–Complete enrollment request form, which is approved by instructors) Advances participants' understanding of practice of leadership in pursuit of the common good. Attention given to many aspects of leadership: personal, team, organizational, visionary, political, and ethical. Emphasis on building and 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 depending on the interests and needs of the fellows.

PA 5961. Seminar: Leadership, You, and the World. (4 cr; SP–Sr or #; A–F only) Leadership theory, community building and social change, and systems thinking. Students conduct/present research on leadership models through literature review, internships, and study groups. Study groups produce major paper describing research project. Participants assemble portfolio demonstrating their leadership learning as University student.

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 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 to AIDS. (3 cr; QP–Upper div or grad or professional school student or #; SP–Upper div or grad or professional school student or #) Survey of HIV infection from a public health perspective emphasizing intervention.

PubH 5040. Dying and Death in Contemporary Society: Implications for Intervention. (2 cr; QP–Pub hlth or ed or hlth sci major or mort sci sr or #; SP–Pub hlth or ed or hlth sci major or mort sci sr or #) Concepts, attitudes, ethics, and lifestyle management related to dying, death, grief, and bereavement. Emphasis on preparing community health and helping professionals and educators for educational activities in this area.

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 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 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 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 5270. Survey of Industrial Hygiene. (2 cr) For nonindustrial hygienists. Overview of science and art of recognizing, evaluating, and controlling health hazards in the workplace.

PubH 5390. Smoking Intervention. (2 cr; QP–Che or epi MPH or epi grad major or #; SP–Che or epi MPH or epi grad major or #) Impact of smoking on U.S. public health; review of research on onset and prevention, factors maintaining dependence, cessation and intervention strategies, public health campaigns, public policies and second-hand smoking controversies, and international issues.

PubH 5394. Mass Communication and Public Health. (2 cr; QP–Social or behavioral sci credits, pub hlth or mass comm grad student or #; SP–Social or behavioral sci credits, pub hlth or mass comm grad student or #) Role, functions, and effects of mass media on public health; planned and unplanned effects; review of literature to understand how theories, models, and assumptions of mass communication research relate to public health.

PubH 5414. Biostatistical Methods I. (2 cr; QP–\$5450; pub hlth or hlth sci grad student or #; SP–\$5450; pub hlth or hlth sci grad student or #) Basic quantitative methods: descriptive statistics, concepts of probability, random sampling and sampling distribution, fundamental inferential procedures (confidence estimation, t-tests and chi-square tests, simple linear regression). Applications to public health studies: design, analysis, and interpretation of results.

PubH 5415. Biostatistical Methods II. (2 cr; QP–\$5420, \$5450; 5414, pub hlth or hlth sci grad student or #; SP–\$5420, \$5450; 5414, pub hlth or hlth sci grad student or #) Continuation of 5414: basic statistical methods, including correlation, regression, analysis of variance and nonparametric tests. Introduction to use of computer packages for data analysis, including SAS.

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 5450. Biostatistics I. (3 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 and interval estimation for means and proportions; hypothesis testing, including t, chi-square, and non-parametric tests; regression and correlation techniques; one-way analysis of variance; 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 B or better in 5414-5415; SP–5450, competence in SAS through 5420 or equiv or grade of B or better in 5414-5415) Analysis of counted data, including contingency table analysis and logistic regression; survival analysis, including Cox proportional hazards regression model.

PubH 5600. Topics in Maternal and Child Health. (1-4 cr; QP-#; SP-#)
New course offerings.

PubH 5601. 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 5611. 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 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 5621. Women's Health: Issues and Controversies. (3 cr; QP-Sr or grad or professional school student preferred; SP-Sr or grad or professional school student preferred)

Women's health concerns, health status, and health care today. Historical, socioeconomic, and gender perspectives; public health principles; access parameters; and multidisciplinary aspects. Roles of women as consumers and providers.

PubH 5623. 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)
Adolescent sexuality and 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 5625. 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 5637. 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 5651. 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 professional in pub hlth or ed)
Systems change strategies and building skills in public policy research, information and perception management, coalition building, personal persuasion, and advocacy.

PubH 5653. 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 5661. 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 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 5677. Maternal and Child Health Master's Project. (2-3 cr; QP-Mch major, #; SP-Mch major, #; S-N only)

Students work with their adviser to complete one of three types of master's projects: research, critical literature review, technical report.

PubH 5691. Independent Study in Maternal and Child Health. (1-5 cr; QP-Pub hlth or grad student, #; SP-Pub hlth or grad student, #)

Independent study with direction from a maternal and child health faculty member.

PubH 5696. Field Experience in Maternal and Child Health. (2-4 cr; QP-Mch major, #; SP-Mch major, #; S-N only)

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 5727. Health Leadership and Effecting Change. (2 cr; QP-Pub hlth or grad student or #; SP-Pub hlth or grad student or #)

Applications of a broad theoretical base in planned change to solve managerial and organizational problems in students' future roles as leaders in the health professions.

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.

PubH 5737. Topics: Multidisciplinary Perspectives on Aging. (3 cr; QP-\$AdEd 5440, \$CPsy 5305, \$Gero 5105, \$HSU 5009, \$Nurs 5780, \$Phar 5009, \$Soc 5960, \$SW 5024; upper div or grad or extension student; SP-\$AdEd 5440, \$CPsy 5305, \$Gero 5105, \$HSU 5009, \$Nurs 5780, \$Phar 5009, \$Soc 5960, \$SW 5024; upper div or grad or extension student)

Sociological, biological, and 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.

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 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 5791. Independent Study: Public Health Administration. (1-8 cr [max 8 cr]; QP-Pha major, #; SP-Pha major, #)

Independent study, under tutorial guidance, of selected problems and current issues.

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 5909. Topics: Public Health Nutrition. (1-12 cr [max 12 cr]; QP-Pub hlth nutr major or #; SP-Pub hlth nutr major or #)

Independent study with faculty guidance in research topic.

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.

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 3541. Recreation Programming. (3 cr; QP-1520 or #; Rec major; SP-1501 or #; Rec major; A-F only)

A variety of methods, skills and materials needed for planning, developing, implementing, and evaluating professional recreation programs for diverse populations in a variety of 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. (1-15 cr; QP-Sr, rec major, or #; SP-Sr, rec major, 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 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. Leisure and Aging. (3 cr; QP-3540 or 5100 or #; SP-3541 or 5111 or #; A-F only)

Role of leisure in the maintenance of mental, physical, and social-emotional health and functioning. Pertinent issues relative to prevention of impairments and disability, rehabilitation, support of vital life involvement, and the impact on the design and 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. (3 cr;

QP-3150; SP-2151 or #; A-F only)
Rationale for and methods used in the application of wilderness and adventure education programs in education, recreation, corporate, and human service settings. Emphasis on adventure and 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-5460; kin or rec major or #; SP-5461; kin or rec major or #; 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.

Rec 5511. Women in Sport and Leisure. (3 cr; QP-5510;

SP-5511; A-F only)
Critically examine women's involvement in and contributions to sport, physical activity, and leisure.

Rec 5801. Legal Aspects of Sport and Recreation.

(4 cr; QP-3550 or #; SP-5801; 3551 or 5461 or #; A-F only)
Legal issues related to recreation, park, and sport programs and facilities with public and 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-MEd or grad student or #;

SP-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-53034,

5JwSt 1034, 5JwSt 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 1082. Jesus in History. (3 cr; SP-51182)

Jesus of Nazareth in his original setting. Modern approaches to the historical Jesus. Perspectives and needs of early gospel writers and effects of portrayals of Jesus. Shifting representations of Jesus in new historical and cultural situations. Meets with RelA 1182.

RelA 1182. Honors Course: Jesus in History. (3 cr;

SP-51082)
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 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 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 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 3172. Honors Course: The New Testament. (4 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. Meets with 3072. Honors students meet weekly for an additional recitation section.

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 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 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-No knowledge of Hebrew 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-Knowledge of Hebrew not required)
Origins 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: The History of Israel from Conquest to Exile. (3 cr; SP-Knowledge of Hebrew not required; 3501 recommended)
Israelite history in the context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focus on issues raised by archaeological data related to the Israelite conquest of Canaan.

RelA 3503. History and Development of Israelite Religion I. (3 cr; SP-\$5503; 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.

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 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)
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*.

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.

RelA 5501. Ancient Israel: The Origins of Israel in Biblical Traditions. (3 cr; SP-\$3501)
The foundation of the Hebrew people; traditions of the patriarchal period; development of Israelite religious and the legal institutions; ancient Near Eastern context of Israel.

RelA 5502. Ancient Israel: The History of Israel from Conquest to Exile. (3 cr; SP-\$3502; knowledge of Hebrew not required)
Israelite history in the context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focus on issues raised by archaeological data related to the Israelite conquest of Canaan.

RelA 5503. History and Development of Israelite Religion I. (3 cr; SP-RelA 3503)
Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

RelA 5504. Development of Israelite Religion II. (3 cr)
Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, Roman.

RelA 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 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. Credit may vary from term to term to a limit of nine.

Rhetoric (Rhet)

Department of Rhetoric
College of Agricultural, Food, and Environmental Sciences

Rhet 1001. Introduction to Scientific and Technical Communication. (1 cr; S-N only)
History of technical communication and its connection to rhetoric. Guest speakers, discussions, and activities introduce technical writing, speaking, multimedia, and their applications in science/technology fields such as health sciences, computer science, and agriculture. Portfolios, professional organizations, and publications.

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 1152. Writing on Issues of Science and Technology. (3 cr; SP-Exemption from 1101 or equiv or honors; A-F only)
Explore the ethical, social, and political challenges science and technology create. Analysis of persuasive 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 1371. 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 1381. Fictional History: 20th Century Through the Eyes of Novelists. (3 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 3221. Theories of Human Communication. (3 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 specific to scientific or technical topics. Techniques for visual communication, audience analysis, organizing a presentation, and presenting complex material. Emphasis on the 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 and team building from the perspective of managers and leaders. Communication techniques in the small group decision making process. Theories of small group communication and teams with case studies in leadership. Includes a demonstration project for each student.

Rhet 3270. Special Topics. (1-3 cr [max 3 cr]; QP-STC major or #; SP-STC major or #)
Topics vary. 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 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.

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. (3 cr; QP-1101 or 1151 or EngC 1011 or equiv; SP-1101 or 1152 or EngC 1011 or equiv; A-F only)
Written and oral communication in professional settings. Gathering information; analyzing the audience; assessing conventional formats; drafting, testing, and revising documents; oral presentation of final reports.

Rhet 3701. Rhetorical Theory and Scientific and Technical Communication. (3 cr; QP-1101, 1151, EngC 1011, or equiv; SP-1101, 1152, EngC 1011, or equiv)
Principles and history of rhetorical theory and criticism. Emphasis on classical theories, especially Aristotle's Rhetoric. Apply Aristotelian concepts to examples of contemporary communication. Relationship of classical theory to scientific discourse and technical communication.

Rhet 4105. Corporate Video for Technical Communicators. (3 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; SP-STC major or #)
Principles and concepts of human factors and usability testing. Text-based, expert-based, reader-based, and prototype-based user testing; developing test objectives, criteria, and measures; conducting tests in lab, field, and virtual environments; using software programs to analyze qualitative and quantitative data.

Rhet 4561. Editing and Style for Technical Communicators. (3 cr; QP-STC major or grad student; SP-3562, STC major or grad student or #)
Editorial process, levels of style, and ethical considerations. Practice editing skills and work with cohesion, clarity, coherence, organization, and audience. Learn about the writer-editor relationship and editing material in a mark-up language. Learn 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 student or #; SP–STC major or grad student 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 5108. Gender and the Rhetoric of Science and Technology. (3 cr)
How cultural gender roles are affected by science and technology and their influence on scientific and technological thinking, particularly through communication strategies, language, and image. Values and goals of past and present scientific and technological communities.

Rhet 5111. Message Design: Theory and Practice I. (3 cr; A-F only)
Audience analysis, media selection, and message design through a variety of theoretical perspectives including cognitive and schema, social construction, feminist, and intercultural theories. Usability testing and contextual inquiry as means to study the effectiveness of messages.

Rhet 5112. Message Design: Theory and Practice II. (3 cr; SP–5111; A-F only)
Political, economic, social, and technical dimensions of media selection and message design. Apply theories of message design and media selection to an on-line design project. Media analyses, scripts, budgets, treatments, project design plans, and various interactive screens.

Rhet 5196. Internship in Scientific and Technical Communication. (3-6 cr [max 6 cr]; QP–STC grad student or #; SP–STC grad student 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, and focus group interviewing. Emphasis on guides, schedules, questioning techniques, and communication theories in employment cycle interviews. Descriptive statistics used to analyze data for various projects.

Rhet 5270. Special Topics. (1-3 cr [max 3 cr]; QP–STC/RSTC grads or majors, #; SP–STC/RSTC grads or majors, #; A-F only)
Topics vary, see *Class Schedule*. For full details, inquire at the department office before registration.

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 and survey research techniques for both quantitative and qualitative methodologies in STC. Face-to-face, telephone, and focus group interviewing; questionnaire development; contextual inquiry; using rating, ranking, and q-sort methods. Ethics, experimental bias, and inferential statistical analysis.

Rhet 5531. Scientific and Technical Communication Course Development and Pedagogy I. (3 cr; QP–Grad student or sr or #; SP–Grad student; A-F only)
Focus on pedagogical philosophy and methodology in the beginning writing, speaking, and technical communication class. Introduction to theories underlying teaching with technology.

Rhet 5532. Scientific and Technical Communication Course Development and Pedagogy II. (3 cr; QP–5531 or #; SP–5531; A-F only)
Mentor with Rhetoric faculty. Issues facing new teachers and development of a philosophy of teaching. Focus on evaluating work in the classroom and designing classroom research.

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 5662. Advanced Technical Communication. (3 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; SP–3562 or #; A-F only)
Criticism and practice to examine how science is “translated” for popular audiences. Use rhetorical theory to critique popularized articles. Develop a heuristic for writing articles and consider controversial issues surrounding the movement from science as “science” to science as “popular.”

Rhet 5775. Major Figures in the Aristotelian Rhetorical Tradition: Classical Period. (3 cr; A-F only)
Theories of rhetoric in the Classical world; epistemological status of rhetoric; the ethical implications of persuasion. Emphasis on Aristotle’s *Rhetoric* as the founding document. Other figures, including Plato, Isocrates, Cicero, Quintilian.

Rhet 5776. Major Figures in the Aristotelian Rhetorical Tradition: Modern Era. (3 cr; A-F only)
Aristotelian rhetoric in the modern era; Francis Bacon and scientific revolution; George Campbell and the rise of the human sciences; Kenneth Burke and the study of semiotics in the 20th century; Perelman/Olbrechts-Tyteca and the 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.

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 3312. Honors Major Project in Russian. (3-4 cr; SP–Major, #; A-F only)
Directed research and 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 5021. Russia Study Tour. (6-18 cr; SP–3002 or equiv)
Study of Russian language and culture in an accredited institution in Russia.

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.

Scandinavian (Scan)

*Department of German, Scandinavian, and Dutch
College of Liberal Arts*

Scan 3501. Scandinavian Culture Past and Present. (3 cr)

Cultural, social, and political developments; principal views and core values; major cultural figures; Scandinavian mentality. Readings in translation for nonmajors. Invited lectures on central topics within selected areas of study.

Scan 3502. Scandinavian Myths. (3 cr)

Literary and cultural investigation of the popular beliefs, myths, and religion of the medieval Scandinavians; the interaction of paganism and Christianity; the reflection of myths in Old Scandinavian literature and art. All readings in English.

Scan 3503. Scandinavian Folklore. (3 cr)

Literary and folkloristic investigation of Scandinavian folktales and legends. Readings in translation for nonmajors.

Scan 3504. The Immigrant Experience. (3 cr)

Issues of origin and language, immigration and settlement, traditions and values, culture and politics, and transgressions of boundaries from the old to the new studied through photos, diaries, letters, stories, and novels by Moberg, Rølvaag, Ager, and other pioneers. All readings in translation.

Scan 3505. Scandinavian Fiction From 1890 to Present. (3 cr)

Examines the search for new forms to represent changing historical situations in the tradition of modernity in texts by Ibsen, Strindberg, Hamsun, Selma Lagerlöf, Hjalmar Bergman, Pär Lagerkvist, Karen Blixen, Moa Martinson, Tarjei Vesaas, Edith Södergran, Ingmar Bergman, and 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 fairy tales from Scandinavia, especially Hans Christian Andersen. Readings in translation for non-majors.

Scan 3605. The Scandinavian Short Story. (3 cr)

Short stories by important 19th- and 20th-century authors from all the five Scandinavian countries. Genre theory and practical criticism. Readings in English for non-majors.

Scan 3606. The Expressionist Film in Scandinavia. (3 cr)

Study of the expressionist film in Scandinavia with emphasis on the work of Carl Dreyer and Ingmar Bergman. Expressionist film is placed in relation to other manifestations of Expressionism in Scandinavia, i.e., theater and painting. Readings in translation.

Scan 3611. Expressionism in Scandinavia. (3 cr)

Expressionism in literature and art, theater and film with emphasis on August Strindberg, Knut Hamsun, Hjalmar Bergman, Edvard Munch, Pär Lagerkvist, Edith Södergran, and Ingmar Bergman. All readings in translation.

Scan 3612. Images of Scandinavia in Art, Film, and Literature. (3 cr)

Images of Scandinavia(ns) in art, film, and literature by both Scandinavians and foreigners. Images of self-knowledge, self-revelation, and otherness. Representative photos and videos of people, locations, and styles. Readings in English.

Scan 3613. Children's Literature in Scandinavia. (3 cr)

Analysis and discussion of representative works in Scandinavian children's literature from picture books to young adult books using a variety of critical methods of interpretation. Taught in English.

Scan 3614. Crime in Scandinavian Fiction and Culture. (3 cr)

Scandinavian ideas of what constitutes crime, and its causative factors and treatment, based on reading popular Scandinavian fiction (detective stories and crime novels), viewing popular crime films, and analysis of Scandinavian views on crime found in the popular media. Readings in translation for nonmajors.

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)

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-#, Δ, □)

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 non-majors.

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)

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-Intro 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-#, Δ, □)

Guided individual reading and study.

Science in Agriculture (ScAg)

College of Agricultural, Food, and Environmental Sciences

ScAg 1001. Orientation to Science in Agriculture. (1 cr; S-N only)

Discussion of the Science in Agriculture major, current issues, career planning, and professional development. Interviews with faculty and other resource persons.

ScAg 1501. Biotechnology, People, and the Environment. (3 cr; A-F only)

Basic concepts in genetic engineering as a foundation for studying the impact of biotechnology on agriculture, medicine, industry, and the environment. Controversial aspects of biotechnology related to public policy issues are discussed.

ScAg 4009. 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)

Ethnocultural 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 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]; OP-#, 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]; OP-#, 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; OP-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; OP-Grad student or #; SP-Grad student 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; OP-Grad student or 12 cr of social sciences; SP-Grad student 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; OP-Grad student or #; SP-Grad student 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; OP-Grad student or adult special or #; SP-Grad student or adult special or #)

Examine concepts and principles of case management practice with special populations such as older adults, persons with developmental disabilities, and persons with serious and persistent mental illness. The core functions of case management practice in a range of settings are addressed in relationship to issues of diversity, vulnerability, and empowerment.

SW 5313. Social Work with Older Adults. (2 cr; OP-Grad student or adult special or #; SP-Grad student or adult special or #)

The practice components of social work with older adults including assessment, intervention, and case management. Taught from the perspective of bio-psycho-social strengths and challenges and within the context of current social policy and delivery systems.

SW 5314. Social Work in the Schools. (2 cr; OP-Grad student or adult special or #; SP-Grad student or adult special or #)

Application of social work methods in a school setting. Emphasizes assessment, diagnosis, consultation, advocacy, interdisciplinary team building, and crisis intervention.

SW 5315. Social Work Practice in Hospitals and Health Care Settings. (2 cr; OP-Grad student or adult special or #; SP-Grad student or adult special or #)

Prepares students for social work practice in a hospital or health care setting. Focus on integration of conceptual and practice subject matter that covers differential assessment, clinical intervention models, impact of acute and chronic illness, special populations, managed care, legal and ethical issues, interdisciplinary team work, and transition planning in health care.

SW 5316. Brief Treatment and the Task-Centered Approach. (2 cr; OP-Grad student or adult special or #; SP-#8303; grad student or adult special or #)

The advent and current prominence of brief treatment models in work with individuals, families, and groups including their theoretical and empirical bases. Practice with diverse populations in a context of managed care. Emphasis on the task-centered approach including skill training and supervised practice.

SW 5317. Social Work With Involuntary Clients. (2 cr; QP–Grad student or adult special or #; SP–Grad student or adult special or #)

Includes theory, ethics, effectiveness, and intervention methods for work with client systems that experience involuntary contact with a social worker. Interventions at micro, mezzo, and macro levels are included. Practice in varied settings such as child welfare, mental health, corrections, and public schools as well as practice related to organizational responses to change.

SW 5318. Family-Centered, Home-Based Services. (2 cr; QP–Grad student or adult special or #; SP–\$8314; grad student or adult special or #)

Ecological, multisystems approach focusing on the family system. Triadic theory, meta-neutrality, strengths-focus, case management and team treatment. Family-based services evaluated for high-risk, multiproblem 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–Admission to child abuse prevention specialization)

Foundation of research and theory for the 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)

Understanding risk factors, protective factors, and resilience in cultural settings; identifying and designing inventive 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)

Designing instruments for child abuse risk assessment based upon research. Culturally and ethnically competent interviewing skills; ethnographic interviewing; strengths-based ecosystemic assessment. Strategies for evaluation of interventions. This is the 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 adult special or #)

Prevention and interventions with perpetrators, survivors and social institutions; research on perpetration, effects on victims, and social responses to family violence. Focus on child abuse and neglect, and abuse of women and 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 student or adult special or #; SP–\$5705; grad student or adult special 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 student or adult special or #; SP–\$5705; grad student or adult special or #)

Current theories, research, and evaluation of interventions with battered women and their families. Focus on practice, e.g., direct work with social institutions, victim-survivors, and assailants and their families.

SW 5708. Substance Abuse and Social Work. (3 cr; QP–Grad student or adult special or #; SP–Grad student or adult special or #)

Assessment and intervention in situations involving substance abuse with special emphasis on cross cultural practice. Relationships of substance abuse to areas such as child welfare, mental illness, and violence within families are examined.

SW 5810. Seminar: Special Topics. (1-4 cr)
Topics specified in *Class Schedule*.

SW 5811. Social Work Ethics. (2 cr; QP–Grad student or adult special or # ; SP–\$8801, grad student or adult special or #)

Acquire knowledge base and develop skills required to identify ethical issues, resolve ethical dilemmas, and make ethical decisions within the context of the professional practice of social work. Values base and ethical standards of the profession and ethical decision-making models are examined in-depth.

SW 5812. Legal Aspects of Social Work. (2 cr; QP–Grad student or adult special or #; SP–\$5813, \$8801; grad student or adult special 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 student or adult special 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)
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)

Scientific study of human societies and behavior. Major theories, methods, concepts, and research findings. Characteristics of the basic social units, their patterns of interrelation, and processes of change.

Soc 1011. Honors: Introduction to Sociology. (3 cr; QP–Honors student; SP–Honors student)

Scientific study of human societies and behavior. Major theories, methods, concepts, and research findings. Characteristics of the basic social units, their patterns of interrelation, and 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.

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. By special arrangement only.

Soc 3094. Directed Research. (1-4 cr; QP–#; SP–1001, #)
Guided research experience at the sophomore level. By special arrangement only.

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 3211. 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 3251. Sociological Perspectives on Race, Class, and Gender. (3 cr; A-F only)

Race, class, and gender as aspects of social identity and features of social organization. Experiences people of color in the United States; exploration of family life, social policy and processes of social reproduction, and possibilities for social change.

Soc 3301. 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 3351. 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 and values, political parties, welfare state, future of European integration, and political stability and democratization.

Soc 3411. 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 3451. 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-SEAS 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-SEAS 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 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, analysis of variance, and 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 3991. 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. By special arrangement only.

Soc 4094. Directed Research. (1-4 cr; QP-#; SP-#)

Guided research experience at the junior/senior level. By special arrangement only.

Soc 4101. 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 #; 5161, 5162 recommended; SP-3111 or #; 4161, 4162 recommended; A-F only)

Police organizations and operations from a social science perspective. Formal and informal policing: role and functions; legal bases; accountability and 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 or 4161 or #; only grad students may register S-N)

Evolution of juvenile court; organizational relationships among court, police, and other agencies; policies regarding serious and 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 student; SP-Sr or grad student; 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 student or law; SP-Sr or grad student; 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 nonlethal 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 4966. Advanced Project Seminar. (4 cr; QP-All other required sociology coursework, Δ; SP-3701, 3801, 3811, 12 additional upper div sociology cr, Δ; A-F only)
Assists sociology majors in preparing research reports that satisfy the major project requirement. Provides guidance and direction in defining a research problem, collecting or selecting data, analyzing data, and writing a sociology research paper.

Soc 4967. 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 4977. 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. Presentations by and discussion with faculty researchers.

Soc 4978. Senior Honors Proseminar II. (3 cr; QP-5977; SP-4977 or #; Δ; Sr soc honors major, 3701, 3801, 3811, 9 additional upper div 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. By special arrangement only.

Soc 5301. 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)
Precalculus 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 1426. 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-51125; Chem 1051; SP-51125; 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 3612. 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 4021. 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 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, 3612 or MicB 3021, Chem 1051 or equiv, Phys 1042 or equiv or #; 3416 recommended; SP-2125, 3600 or MicB 3021, Chem 1021 or equiv, Phys 1042 or equiv or #; 3416 recommended)
Principles of microbiology, chemistry, and physics applied to evaluation of pollution of soils. Study mitigation of pollution in agricultural and urban settings, as well as 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. Soil Physics: Transport Properties and Processes. (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 and processes governing the transport of mass and energy in soils. Principles of water and solute transport in unsaturated soils, and their role in subsurface hydrology and water quality.

Soil 5311. Soil Chemistry and Mineralogy. (3 cr; QP-Chem 1052 or equiv, Phys 1041, grad student or #; SP-Chem 1022 or equiv, Phys 1042, grad student or #)
Structural chemistry, and origin and identification of crystalline soil clay minerals. Structure of soil organic matter. Chemical processes in soil: solubility, adsorption/desorption, ion exchange, oxidation/reduction, acidity, and 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-45311 recommended)
Companion laboratory 5311. Clay mineral preparation for x-ray diffraction, selective mineral dissolution, cation exchange properties, absorption and solubility reactions and their modeling, carbonate equilibria, and organic matter extraction and identification.

Soil 5401. 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 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 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 hill slope 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 #, sr, 4511 recommend; SP-1125 or 2125 or equiv or #, sr, 4511 recommend; A-F only)
Morphology, chemistry, hydrology, and formation of mineral and 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, and mitigation. Field trips, lab, and 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 student, BioC 3xxx and MicB 3xxx recommended; SP-2125, Biol 1009 or equiv, Chem 1021 or equiv, sr or grad student, 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 interrelationship with literary traditions, both great and small.

SALC 3411. Introduction to Indian Philosophy. (3 cr)
Major concepts; principal schools of Indian philosophy; traditional and contemporary views.

SALC 3412. Hinduism. (3 cr)
Development of Hinduism focusing on sectarian trends, modern religious practices, myths and rituals, pilgrimage patterns and religious festivals, and the interrelationship between Indian social structure and Hinduism.

SALC 3413. Buddhism. (3 cr)
Historical account of Buddhist religion in terms of its rise, development, various schools, and common philosophical concept. Indian Buddhism, compared with Hinduism; Buddhism's demise and revival on the Indian subcontinent.

SALC 3414. Comparative Religions of South Asia. (3 cr)
Compares and contrasts basic philosophical concepts, literatures, ideologies, and ritualistic practices of Hinduism, Buddhism, and Jainism with those of Islam and Sikhism.

SALC 3456. The Cinema of India. (3 cr)
Survey of cinema of South Asia; aesthetic, social, economic, and political perspectives.

SALC 3506. Introduction to Contemporary South Asia. (3 cr)
Land, people, modern historical development, contemporary problems, global setting, and future outlook of South Asia.

SALC 3521. Gandhi and Non-Violent Revolution. (3 cr)
Character of Gandhi, his influence over contemporaries, and his hold on the world today.

SALC 3556. Women in India: Role and Repression. (3 cr)
Representation of Indian women studied through literature of contemporary Indian women and against background of traditional Indian values and roles.

SALC 3607. Introduction to Indian Civilization. (3 cr)
Indian civilization in light of its development. Social, cultural, economic, and political life. Hindu, Muslim, and Buddhist contributions.

SALC 5011. Indo-Aryan Linguistics. (3 cr)
Phonological, morphological, and syntactic developments; Indo-European, Old Indo-Aryan, Middle Indo-Aryan, Hindi, and other major modern Indo-Aryan languages.

SALC 5090. Instruction in South Asian Languages. (3-5 cr)
Individualized instruction in one of the South Asian languages.

SALC 5201. Ancient Indian Literature in Translation. (3 cr)
Literary achievements of Indian civilization from the ancient period.

SALC 5202. Modern Indian Literature in Translation. (3 cr)
Literary achievements of Indian civilization from the modern period.

SALC 5204. Folklore of India. (3 cr)
A study of the main genres of Indian folklore—folk tales, folk songs, folk epics, folk dramas, proverbs, and riddles—their relationship to Indian society and interrelationship 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)
Societies give shape to their gods and goddesses and in turn are shaped by these mythological constructs. Indian history will be examined by following the 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.

Spanish (Span)

*Department of Spanish and Portuguese
College of Liberal Arts*

Span 0221. Reading Spanish. (0 cr; S-N only)
Intensive reading of a variety of texts to provide a basic reading knowledge of Spanish. At the end of the semester students may take the equivalent of the Spanish Graduate Reading Examination.

Span 1001. Beginning Spanish. (4 cr; SP-Δ for students with 2 or more yrs of high school Spanish)
Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence. Some cultural readings.

Span 1002. Beginning Spanish. (4 cr; SP-1001 or #)
Basic listening, speaking, reading, and writing skills. Emphasis on the development of communicative competence. Some cultural readings.

Span 1003. Intermediate Spanish. (4 cr; SP-1002 or Entrance Proficiency Test)
Speaking and comprehension; development of reading and writing skills based on materials from Spain and Spanish America. Grammar review; compositions and oral presentations.

Span 1004. Intermediate Spanish. (4 cr; SP-Span 1003 or Entrance Proficiency Test)
Speaking and comprehension; development of reading and writing skills based on materials from Spain and Spanish America. Grammar review; compositions and oral presentations.

Span 1014. Business Spanish. (4 cr; SP-1103 or #)
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 3015. Spanish Composition and Communication. (4 cr; SP-1004 or 1014)
Developing communication skills—the ability to comprehend both written and spoken texts and to speak, read, and write in Spanish, beyond the intermediate level. For majors and nonmajors.

Span 3021. Advanced Communication Skills. (4 cr; SP-Span 3015 or #)
Improving all language skills to achieve greater fluency and accuracy in Spanish.

Span 3104. Analysis and Interpretation of Texts. (3 cr; SP-3015; A-F only)
Various ways of understanding the structure of diverse texts and interpreting their meaning. Required for majors.

Span 3105. Introduction to the Study of Hispanic Civilizations. (3 cr; SP-3015 or #)
Cultural issues generated by the integration of the Americas into the emerging world system via the Spanish and Portuguese empires.

Span 3107. Introduction to the Study of Hispanic Linguistics. (3 cr; SP-3015 or #)
Phonology, morphology, syntax, semantics, lexicology, pragmatics, discourse analysis, sociolinguistics, history of the Spanish language. Hispanic linguistics as a theoretical discipline and its relationships with social, cultural, and literary studies.

Span 3211. Literary Discourses of Imperial Spain (1492-1800). (3 cr; SP-§3311; 3104)
Major literary genres of Spain (epic, lyric, narrative prose, dramas, novels, essays) 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-§3312; 3104)
Representative works of fiction, drama, poetry, essay, and film of the past two centuries. Intellectual and 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 3222. Discourses of Nation Building and Modernization in Latin America. (3 cr; SP-§3422; 3105, 3221 or #)
Development of modernity in Spanish America and 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 or #)
Students participate in Spanish-speaking community organizations; analyze academic materials dealing with race, class, gender, current patterns of power in the United States, and roles of citizens within this system; and relate this to their community experience.

Span 3501. Spanish Civilization: Roots of Modern Spain and Latin America. (3 cr; SP-§3411; 3105)
Customs, life styles, art, and culture from the coexistence of Christians, Moors, and Arabs during the Reconquest to national unification; discoveries and conquests up to the “modern state” and political crises of early 19th century.

Span 3502. Spanish Civilization: Modern Spain. (3 cr; SP-§3402; 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 3510. Issues in Hispanic Cultures. (3 cr [max 9 cr]; SP-§3410; 3105; A-F only)
Practices that have shaped the cultural identity of Spanish- and Portuguese-speaking areas: folklore, religion, armed conflict, drug traffic, language and citizenship, political movements, commodification of national myths and icons. Topics vary.

Span 3512. Modern Latin American Civilization. (3 cr; SP-§3412; 3105; A-F only)
Impact of various forms of modernization on the symbolic production in Latin American racial, ethnic, class relations, institutional, and ideological structures.

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)
Cultural and 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-§3801; 3107)
Phonetics and phonology of modern Spanish. Regional and social variants of the language in Spain and Spanish America.

Span 3702. The Structure of Spanish: Morphology and Syntax. (3 cr; SP-§3802; 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 3703. Origins and History of Spanish and Portuguese. (3 cr; SP-§3803; 3107 or #)
Relationships with Latin; intermediate stages of evolution not considered. Phonetic, morphological, syntactic, and sociolinguistic aspects of diachronic variation.

Span 3704. Sociolinguistics of the Spanish-Speaking World. (3 cr; SP-§3804; 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 3705. The Semantics and Pragmatics of Spanish. (3 cr; SP-§3805; 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 3730. Topics in Hispanic Linguistics. (3 cr [max 9 cr]; SP-§3830; 3107 or #)
Topics specified in *Class Schedule*.

Span 3910. Topics in Spanish Peninsular Literature. (3 cr [max 9 cr]; SP-§3310; 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 3920. Topics in Spanish-American Literature. (3 cr [max 9 cr]; SP-§3320; 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 3940. Figures in Spanish Peninsular Literature. (3 cr [max 9 cr]; SP-§3340; 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 3950. Figures in Spanish American Literature. (3 cr [max 9 cr]; SP-§3350; 3104 or #)
One major writer or group of writers whose work has had an impact on thought, literature, or social issues. Figures are 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 3972. Graduation Seminar. (3 cr; SP-§3974; 31 cr of Span 3xxx or SpPt 3xxx courses, Δ; A-F only)
Work on major project about Hispanic linguistics, language acquisition, cultural studies, and peninsular, Latin American, and U.S. Latino theatre and literatures. Advanced planning is essential. Clearance must be arranged through the department advising office.

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, Catalan, 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)

Literature of the Spanish-speaking Caribbean with emphasis on the 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 1700s. Conquest and colonial writing and counter writing; 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, #)

Linguistic types and processes that appear across languages, such as grammatical relations, word order, transitivity, subordination, information structure, grammaticalization, and how these are present in the 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
College of Liberal Arts

SpPt 3256. Latin American Cultural Discourse. (3 cr; SP-\$3456; Span 3105)
Cultural assumptions in current modes of interpreting Latin American reality. Representative texts are analyzed.

SpPt 3605. Symbolic Expression in Hispanic Politics. (3 cr)
Political upheavals, national liberation movements, and civil wars in Spain, Latin America, Portugal, Lusophone Africa, and the Hispanic population in the United States, either individually or in various forms of interrelations. Political activity and symbolic expression beyond literature. Taught in English.

SpPt 3608. The Political Foundations of Hispanic Theatre. (3 cr)
Study of drama as reality and metaphor using traditional, modern, and vanguard plays. Works of Cervantes, Lope de Vega, Calderón, Unamuno, Valle-Inclán, Triana, and Usigli. Films, videos, attendance of local and touring theatre groups.

SpPt 3611. Modern Latin American and Latino Writing. (3 cr)
A comparative approach to literature of the Spanish- and Portuguese-speaking Americas, including Latino writing in the United States. Emphasis on women's writing. All readings in English. Does not count toward Spanish or Spanish-Portuguese major.

SpPt 5930. Selected Topics in Hispanic Cultural Discourse. (4 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 student 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 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 1313. Analysis of Argument. (3 cr)
Strategies for analyzing, evaluating, and generating arguments. Problems in listening and responding to argument.

Spch 3190. Honors Course: 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. Study of theory, methods, and 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 and communication with an emphasis on interdisciplinary theory. Role of communication in creating, maintaining, reinforcing, and sometimes 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 3451. 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 3452. 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 3601. 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 3605. 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 3631. 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 Worldview. (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 4452. Intercultural Interaction: Theory and Application. (3 cr; SP-#)
Small group interaction across cultures for both international and U.S. students. Discussion, simulations, readings.

Spch 4602. Contemporary Political Persuasion. (3 cr; SP-1101, 3431 or #)
Contemporary political speech. Ideologies in political persuasion.

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 4621. 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 5233. 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 student)

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 cr.

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 cr social science, 3441 or #)

Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.

Spch 5451. 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 5461; 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-§Ling 5462; 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 5615. 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 management 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 3301. Gender and Diversity in Sport. (2 cr; QP-1700; SP-1701; A-F only)

Development of women and girls in sport; minority involvement and influence in sport and legal mandates; sexuality issues; feminism and political issues in sport.

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 and Society. (2 cr; QP-Spst majors only; SP-Spst majors only; A-F only)

Examination of the relationship between sport and contemporary social institutions such as politics, economics, the mass media, religion, race, and other diversity issues.

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, good sport behavior, 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 and spst majors; A-F only)

Overview of the history, development, and current philosophies of physical training methods used in sport. Theory and scientific basis for training methods will be covered as well as methods for evaluation and 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. (2 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; résumé and cover-letter writing; senior project.

SpSt 3996. Practicum: The Sport Experience. (1-8 cr [max 16 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 3011. Introduction to Statistical Analysis. (4 cr; QP-Two yrs high school math; SP-§5021; two yrs high school math)

Describing data and relationships; discrete and continuous random variables; sampling distributions; confidence intervals; 1- and 2-sample significance tests; comparisons count data; simple linear regression; 1- and 2-way ANOVA.

Stat 3021. Introduction to Probability and Statistics. (3 cr; QP-Differential and integral calculus; SP-Math 1272)

Elementary probability and probability distributions; sampling and elements of statistical inference; regression; 1- and 2-way ANOVA; applications to acceptance sampling and control charts.

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 and distributions; generating functions; standard distribution families; data summaries; sampling distributions; likelihood and sufficiency.

Stat 4102. Theory of Statistics II. (4 cr; QP-5121; SP-\$5102; 4101)

Estimation; significance tests; distribution free methods; power; application to regression, analysis of variance, and analysis of count data.

Stat 4893. Senior Paper. (1 cr; QP-Stat major; SP-Stat major)

Satisfies senior project requirement for CLA majors. Directed study. Paper on specialized area, a consulting project, or original computer program.

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)

Application of statistical concepts of random variability and sampling, statistical process control, Shewhart and accumulative charting, analysis of plant data, applications of trend surface analysis, analysis of variance and design of experiments, quality improvement by reduction of random variability.

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 and utility. Optimal statistical decision making. Sequential decisions and decision trees. Backward induction. Bayesian data analysis.

Stat 5101. Theory of Statistics I. (4 cr; QP-\$5121, \$5122; Math 3252; SP-\$4101, \$Math 5651; Math 2263)

Same as Math 5651. Logical development of probability and some basic issues in statistics. Probability spaces, random variables and their distributions and expected values, law of large numbers and central limit theorem, generating functions, sampling, sufficiency, and estimation.

Stat 5102. Theory of Statistics II. (4 cr; SP-\$4102; 5101 or Math 5651)

Estimation, test of hypotheses, size, and power; categorical data; contingency tables; multivariate normal distribution; 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 and 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 5021 or 4102 or 5021 or 5102 or #)

Simple, multiple, and polynomial regression. Estimation, testing, and prediction. Use of graphics in regression. Stepwise and other numerical methods; weighted least squares; nonlinear models; response surfaces. Experimental research and 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 and analysis of complete and incomplete block designs, fractional factorial designs, confounding split plots, and 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, and contingency tables. Tests for independence. Combining 2x2 tables. Multidimensional tables and loglinear models, maximum-likelihood estimation, and tests for goodness of fit. Logistic regression, generalized linear models, and 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, 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 need and available staff.

Stat 5993. Tutorial Course. (1-3 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-3011)

Discussion of novels, short stories, plays, and articles complemented by structural, stylistic, and vocabulary-building exercises.

Swed 4001. Beginning Swedish. (2 cr; SP-\$1001; passing score on GPT in another language or grad student)

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 student)

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 student)

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 student)

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 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 of 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 of 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; SP–Ling 5001 or #)
Prepares students interested in second language learning to engage in meaningful, appropriate, and fair second language assessment practices. Students develop the ability to interpret results of existing tests and participate in the construction of 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 1101. Introduction to the Theatre. (3 cr)
A lively introduction to the art and craft of theatre, building skills in the appreciation and critical analysis of plays and performances, including examples of the diversity of theatre's interaction with society from a variety of 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 1321. Beginning Acting. (3 cr; QP–1101; SP–1101)
Acting technique for the stage, emphasizing Stanislavski-based vocabulary. Exercises and improvisations leading to scene work and 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 and performance of prose, poetry, and dramatic text. Part II: Body movement and relaxation combined with acting technique leading to individual and group performance.

Th 1901. Introduction to Performance. (4 cr)
A hands-on exploration of the nature of live performance. What it means to be a performer. How live performance fits into our culture; its range and diversity, historical context, and current trends.

Th 1905. Honors Course: The Theatre—Introduction and Beyond. (2 cr; QP–1101, #; SP–1101, 1901)
Enrichment course for students with outstanding records who have completed both 1101 and 1901. Topics specified in *Class Schedule*.

Th 3100. Theatre Practicum. (1 cr [max 4 cr]; SP–1101; S-N only)
Participation in a University Theatre main stage play as actor, construction or running crew personnel, or theatre management operations participant. Only two registrations as actor may count toward the major.

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: Romanticism to the Present. (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. Romanticism to the present.

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 and monologues from contemporary and modern psychologically-based drama, early 20th-century texts, and the classical repertoire. Lecture, discussion, exercises, and performance.

Th 3322. Intermediate Acting II. (3 cr; QP–3321; SP–3321)
Analysis of text, character, and relationship in scenes and monologues from contemporary and modern psychologically-based drama, early 20th-century texts, and the classical repertoire. Lecture, discussion, exercises, and performance.

Th 3513. Design and Technical Production I. (4 cr; QP–1101, 1504, 3100/5100 or #; SP–1101)
Theory, process, and execution of design and technology from script to production on stage. Scenery and properties.

Th 3515. Design and Technical Production II. (4 cr; QP–1101, 1504, 3100/5100 or #; SP–3513)
Theory, process, and execution of design and technology from script to production on stage. Costumes and lighting.

Th 3711. Beginning Directing. (3 cr; QP–1101, 1321, jr; SP–1101, 1321)
Techniques and theories of stage direction. Script analysis, composition, blocking, rehearsal methods, improvisation, actor coaching, and scene production.

Th 3950. Topics in Theatre. (1–4 cr [max 8 cr]; QP–Varies by topic; SP–Varies by topic)
Topics specified in *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 4177. Survey of Dramatic Literature I. (3 cr)
Chronological study of theatrical structure from ancient time to mid-18th century.

Th 4178. Survey of Dramatic Literature II. (3 cr)
Chronological study of theatrical structure from mid-18th century to the present.

Th 4532. Makeup for the Actor. (2 cr; QP–1101; SP–1901)
Topics vary, including functions and aesthetics of stage makeup, application techniques, prosthetics, and facial hair.

Th 4901. Senior Seminar. (3 cr; QP–Sr, Th or Dnce major; SP–Sr, Th or Dnce major; S-N only)
Seminar for completion of the major project. Meets with Dnce 4901.

Th 4905. Honors Course: Tutorial Seminar in Theatre Arts. (2–4 cr [max 4 cr]; SP–Candidate for honors in theatre arts, Δ [limited to 2 cr for cum laude, magna cum laude; up to 2 additional cr for summa cum laude])

Independent reading and research in selected fields in preparing honors thesis or creative project. Detailed requirements available from the department's director of honors.

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 techniques, creative thinking, and rehearsal techniques.

Th 5321. Career Preparation for the Actor. (3 cr; QP–3323 or MFA actor or #; SP–3322 or MFA actor)
Information and techniques necessary for the professional acting career.

Th 5322. Acting for the Camera. (3 cr; QP–3323 or MFA actor or #; SP–3322 or MFA actor)
Differences between stage acting and acting for the camera. Learn film technique with hands-on experience of using equipment. Scenes and monologues rehearsed and performed for the camera with playback on videotape for class critique.

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.

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 5351. Musical Theatre. (3 cr; A-F only)

History of American musical theatre featuring videos/discussions, basic music theory, voice, dance, acting, and audition techniques. Solo and ensemble presentations for a public class performance.

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 student, #; SP–3515 or grad student or #)

Development of skills necessary for the presentation of theatre scene and costume designs. Practical study of materials, layout, and techniques used in scene painting. Focus on basic drawing/graphic skills.

Th 5515. Design Composition and Collaboration. (3 cr; QP–Grad student or 3513, 3711, #; SP–Grad student 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 student or #; SP–3515 or grad student or #)

Conceiving and communicating design ideas in both two-dimensional sketches and three-dimensional models for the theatre and allied venues. Drafting.

Th 5530. Costume Design. (3 cr [max 9 cr]; QP–3515 or grad student or #; SP–3515 or grad student 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 student or #; SP–3515 or grad student 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 student or #; SP–3515 or grad student 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 a science and the technology used to create and manipulate sound, including, recording techniques, effects processing, signal processing and recording, microphone, and mixing techniques.

Th 5557. Digital Audio and MIDI for Performance. (3 cr)

Hands-on computer and CPU-generated audio technology and the 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 the presentation of theatre scene and costume designs. Practical study of materials, layout, and techniques used in scene painting. Focus on rendering and scene painting skills.

Th 5570. Properties/Scenery Technology. (1-3 cr [max 15 cr]; QP–3513 or grad student or #; SP–3515 or grad student 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 student or #; SP–3515 or grad student 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 projects in technology or craft areas of theatre that further develop practical skills or knowledge in costume, lighting, makeup, props, scenery, sound, or theatre management.

Th 5711. Advanced Stage Direction. (3 cr; QP–3711 or grad student or #; SP–3711, # or grad student)

Realistic and nonrealistic dramatic forms, theory and technique of rehearsal, solving production problems, and directing three one-act plays.

Th 5715. Actor-Director Collaboration. (3 cr; QP–3323, 3711 or #; SP–Grad student 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–Grad student or 1101, 1321, soph)

Theories, practicalities, and techniques for dealing with rehearsal and performance; organization and management in various types of performance venues.

Th 5718. Principles of Theatre Management. (3 cr)

Nonprofit theatre structure: concept, mission, organizational structure, financial, marketing, fundraising and grant-writing strategies. Facilitated by discussion and guest professionals from the Twin Cities' arts and funding communities.

Th 5753. Text Analysis for Drama. (3 cr; QP–5711 or grad student; SP–5711 or grad student)

Tools for intensive textual analysis for advanced directors and designers. Both traditional, Aristotelian analysis and contemporary approaches are covered through theories and 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 (TxcI)

Graduate School

TxcI 5011. Principles of Toxicology. (2 cr; SP–Grad txcI 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. Intermediate Interpreting. (3 cr; QP–3101,

high level of proficiency in spoken English and another language as demonstrated by application; SP–3101, high level of proficiency in spoken English and another language as demonstrated by application)

A practical and theoretical course aimed at developing professional levels of proficiency in interpreting in health, human service, and legal settings with emphasis on professional/client dialogues. Topics include consecutive interpreting skills, vocabulary research and storage, intercultural issues, analysis of the interpreting process. Performance assessment through audio- and videotaping. Subject languages (e.g., Spanish, Russian, Somail) will be specified for each section.

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)

University College

UC 3075. Directed Study. (1-15 cr; SP–#)

UC 3211. Degree Planning. (8 cr; S-N only)

For new Program for Individualized Learning students to develop individualized curricular plans for their baccalaureate degrees.

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 cap-stone project for their degree. Narrative evaluation from the project adviser/evaluator required.

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 B.A. or B.S. approval.

Urban Studies (Urbs)

*Department of Geography
College of Liberal Arts*

Urbs 1001. 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 3001. 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; A-F only)
A forum for intensive discussion of multiple urban/metropolitan issues. Topics change with each offering to reflect current concerns. Encompasses in-depth reading and group discussion.

Urbs 3202. Urban Studies Colloquium. (1 cr; A-F only)
A forum for intensive discussion of multiple urban/metropolitan issues. Topics change with each offering to reflect current concerns. Encompasses in-depth reading and group discussion.

Urbs 3301. 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; A-F only)
This course will link students' academic learning to actual urban problems and issues by focusing on a specific topical area and using the local community as a laboratory. Field work and contact with local institutions and agencies will be expected.

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; A-F only)
A weekly seminar which serves to integrate an internship experience with the academic programs of students. Must be taken in conjunction with the internship placement. Internships may be arranged for a semester or summer term.

Urbs 3955. Senior Paper Seminar. (1 cr; SP–Urbs sr or #; A-F only)
This seminar is intended for urban studies seniors who are undertaking their senior papers. Methods and resources for research will be the focus and significant writing will be expected.

Urbs 3993. Urban Studies Directed Study. (2-3 cr [max 6 cr]; SP–Urbs major, #, 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 student 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.

Veterinary Pathobiology (VPB)

*Department of Veterinary Pathobiology
College of Veterinary Medicine*

VPB 2022. General Microbiology. (2 cr; SP–3 cr biol)
Intended primarily for non-microbiology majors. 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

VPB 2032. General Microbiology with Laboratory. (4 cr; SP–3 cr biol)
Intended primarily for non-microbiology majors. 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.

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 1001. Introduction to Women's Studies. (3-4 cr)
U.S. multicultural and cross-cultural studies of contemporary social, cultural, and personal conditions of women's lives. Includes honors recitation.

WoSt 1002. Introduction to Gender Studies. (3-4 cr)
Survey of historical, cultural, psychological, and social dimensions of analyzing gender. How various groups (based on race, class, sexual orientation,

ethnicity, region) have different understandings of gender ideals and gender deviances. Includes honors recitation.

WoSt 3001. Introduction to Sexuality Studies. (3-4 cr)
Interdisciplinary survey of lesbian, gay, bisexual, and transgender studies. Includes honors recitation.

WoSt 3002. Introduction to U.S. Ethnic Studies of Women, Race, and Class. (3-4 cr)
Comparative study of women and gender, race, class, sexuality in two or more U.S. ethnic cultures. Includes honors recitation.

WoSt 3003. Introduction to Women and World Cultures. (3-4 cr)
Focuses on the similarities and differences in women's experiences throughout the world from a cross-cultural and historical perspective. Uses a range of reading materials and media (feminist scholarship, fiction, film, news media, oral history, autobiography). Includes honors recitation.

WoSt 3004. Point/Counterpoint: An Introduction to Contemporary Feminist Debates. (3-4 cr)
Contemporary debates of concern to many women such as abortion, affirmative action, marriage rights, welfare rights, sex education, children's rights, and date rape. In-depth study of several of these issues, the debate, and relevant perspectives. Includes honors recitation.

WoSt 3102. Feminist Thought and Theory. (3-4 cr)
Feminist theoretical perspectives, asking how theory develops both in response to earlier theoretical traditions and in the context of diverse forms of practice, starting from the assumptions that theories emerge from (rather than just being applied to) practice.

WoSt 3103. Feminist Expository Writing. (3 cr; QP–EngC 1011 or equiv; SP–EngC 1011, jr WoSt major or minor or Δ)
Intended for women's studies majors only. Stages of composition process; similarities and differences between feminist and traditional expository language and structure; improves skills for analytical and critical thinkers.

WoSt 3190. Topics: Methods of Inquiry. (3 cr [max 12 cr])
Topics specified in *Class Schedule*.

WoSt 3201. Sociology of Gender. (3 cr; SP–\$Soc 3221; 1001 or 1002 or 3001 or 3002 or #)
Organization, culture, and dynamics of gender relations as major features of social life. Gender and racial inequalities in the workplace, relationships between gender and race, gender and culture, sexuality, gendered politics, and the women's movement.

WoSt 3202. Biology of Women. (4 cr)
Biological aspects of the female life course from early development to old age. The biology of sex differences and sexuality, menarche, gestation and parturition, female-specific diseases and conditions, menopause, ways of knowing the biology of the female body. Includes lab.

WoSt 3203. Biology, Race, and Gender. (3 cr; QP–3202; SP–3202 or intro biol course or #)
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. (3-4 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 3301. Women and Literature. (3 cr; QP—Intro literature course; SP—Intro literature course or #)

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; SP—§Chic 3212; intro course in music or art or drama or dance or film or other arts or 1001, 1002 or #)

Study of women in the arts, as represented and as participants (creators and audiences). Discussion of at least two different art forms and works from at least two different U.S. ethnic or cultural communities.

WoSt 3303. U.S. Minority Women Writers. (3 cr)

Interpret and analyze poetry, fiction, and drama of U.S. women minority writers. The relationship of a writer's history, ethnicity, race, class, and gender to her writings.

WoSt 3305. Language and Gender. (3 cr; SP—§Spch 3405)

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; SP—1001, 1002, 3001, 3002, 3102 or intro film course or #)

The portrayal of men and women, masculinity and femininity in film from a feminist perspective. The construction of different notions of gender in film and the social uses of these portrayals. Lectures on film criticism, film viewings, and class discussions.

WoSt 3308. 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 3401. Gender and Geopolitics. (3 cr; SP—1001 or 1002 or 3003 or #)

Gendered theory and practice of geopolitics. Critique of the gendered nature of conventional international relations theory.

WoSt 3402. History of Western Feminism. (3-4 cr; SP—§5402)

Survey of the main currents in the history of Western feminist thought, politics, and social movements from the 1770s to the present.

WoSt 3403. Jewish Women in the United States. (3 cr; SP—§JwSt 3632)

Twentieth century American Jewish women—historically, sociologically, religiously, and culturally; key developments over the century.

WoSt 3404. International Lesbian Studies. (3 cr; SP—1001, 1002, 3001 or #)

Lesbian and gay lives throughout the world. Culturally-specific and transnational aspects of lesbian and gay identity formation, political struggles, community involvement, and global networking. Focus on lesbian and gay life in some 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 3002 or 3003 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; SP—§Hist 3347)

Varied experiences of women in American history from European settlement in North America to the end of the 19th century.

WoSt 3408. Women in Modern America. (3 cr; SP—§Hist 3348; 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 3409. Asian American Women's Cultural Studies. (3 cr)

Diversity of cultures designated Asian American through 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; SP—§Chic 3402)

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 minor or 8 cr WoSt or #)

Year-long, six-credit offering (with WoSt 3502) that combines a 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 3880. Honors Directed instruction. (3-4 cr)

WoSt 3890. Topics: Honors Seminar. (1-8 cr [max 12 cr])
Topics vary; topics honors students would like faculty to develop into a course or topics closely related to faculty research/scholarship or contemporary issues.

WoSt 3893. Honors Directed Study. (1-8 cr [max 12 cr])

WoSt 3894. Honors Directed Research. (1-8 cr [max 12 cr])

WoSt 3980. Directed Instruction. (1-12 cr [max 12 cr]; SP—#, Δ, □)

WoSt 3993. Directed Study. (1-12 cr [max 12 cr]; SP—#, Δ, □)

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 3203 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 4107. Senior Seminar: Research Methods. (3 cr; SP—WoSt sr)

Library research and research methods for women's studies majors working on their senior projects.

WoSt 4108. 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. (3-5 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 student or #)

Topics specified in *Class Schedule*.

WoSt 4201. The Older Woman: A Feminist Perspective. (3 cr; SP—9-12 cr 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—WoSt major or 9-12 cr WoSt or #)

Topics specified in *Class Schedule*.

WoSt 4301. Women Writers of Africa and Latin America. (3 cr; SP—6-8 cr 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 4302. Honors: Women's Personal Narratives.

(3 cr; QP—Sr or grad student or #; SP—Sr or 9-12 cr WoSt or lit or #)

Literary autobiography, journals, travel narratives, essays, slave narratives, and ethnographies to consider the content and the methodological, theoretical, and aesthetic issues associated with the construction and production of women's experience.

WoSt 4390. Topics: Literature, Film, and the Arts. (3 cr; SP—Sr or 6-8 cr WoSt or #)

Topics specified in *Class Schedule*.

WoSt 4401. Chicana/Latina Culture Studies. (3 cr; SP—§Chic 4401; 3002 or 3-4 cr Chicano Studies or #)

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.

WoSt 4490. Topics: Comparative and Global Studies. (3 cr; SP—Sr or grad student or #)

Topics specified in *Class Schedule*.

WoSt 4504. Honors: Women and the Legislative Process. (3 cr; SP—Jr or sr or grad student or #)

Current and historical roles, impacts, and interactions of women as legislators, constituents, and professional or citizen lobbyists in state and national legislatures. Unique contributions, issues, and challenges of women, and ways in which gender is operative in the legislative process.

WoSt 4590. Topics: Civic and Community Studies. (3 cr; SP—WoSt jr or sr or 6-8 cr WoSt or #)

Topics specified in *Class Schedule*.

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; SP-6-8 cr WoSt or feminist studies or soc sci grad student or #)
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-6-8 cr WoSt or grad student 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-9-12 cr WoSt or feminist studies grad student 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 5104. International Feminist Theory. (3 cr; SP-3102, 6-8 cr WoSt or feminist studies grad student or #)
Western and non-western feminist theories in conversation. Attention to historical, cultural, and political context; the relation of theory to activism.

WoSt 5105. Gender and the Rhetoric of Science and Technology. (3 cr; SP-6-8 cr WoSt or grad student 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 student or 9-12 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; SP-9-12 cr WoSt or feminist studies or phil grad student or #)
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 Politics and Processes of Sexuality. (3 cr; SP-9-12 cr WoSt or feminist studies grad student or #)
Comparative examination of the social construction of sexuality, including formal and informal norms and regulations, categories of deviance, representation of sex in the media and arts, and the role of sexuality in relation to agency and subjectivity.

WoSt 5202. Feminist Therapies. (3 cr; SP-WoSt or psych major or grad student or #)
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, 3-4 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; SP-9-12 cr WoSt or feminist studies grad student or #)
Topics specified in *Class Schedule*.

WoSt 5390. Topics: Literature, Film, and Other Arts. (3 cr; SP-9-12 cr WoSt or feminist studies grad student or #)
Topics specified in *Class Schedule*.

WoSt 5401. Lesbian Cultural Production. (3 cr; SP-3001 or feminist studies grad student or #)
Lesbianism and lesbian identities as a product of cultural practices, relations, and meanings that are historically specific and historically changing.

WoSt 5402. History of Western Feminism. (4 cr; SP-\$3402; 6-8 cr WoSt or grad student or #)
Survey of the main currents in the history of Western feminist thought, politics, and social movements from the 1770s to the present.

WoSt 5403. Chicana/Latina Feminisms. (3 cr; SP-\$Chic 5403; 8 cr feminist studies and/or Chic grad student 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-6-8 cr WoSt or feminist studies or Chicano studies grad student or #)
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.

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-6-8 cr WoSt or pre-law or feminist studies grad student or #)
The legal system as it relates to women: an historical legal approach to issues related to the constitutional rights of women.

WoSt 5502. Women and Public Policy. (3 cr; SP-Jr or sr major or 9-12 cr WoSt or pol sci or pre-law or grad student or #)
Study of public policy issues, processes, and histories as they affect women and children and gender related issues.

WoSt 5504. Honors: Legislative Internship. (3-5 cr; SP-4504 or equiv or grad student, Δ)
Discussion group and learning community for students working as interns for a Minnesota legislator during the year's legislative session.

WoSt 5505. Indigenous Women and 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. (4 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 3301. Wood Industry Tours. (1 cr; QP-1301; jr or sr or #; SP-1301; jr or sr or #)
A five-day bus tour consisting of visits to a dozen or more manufacturers representing a broad cross section of the wood-using industry.

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.

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 4200. Honors Seminar. (1 cr; QP-Admission to WPS honors program; SP-Admission to WPS honors program; A-F only)
Lectures and discussions on current topics presented by faculty and students.

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-One 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, 5303; SP-4303, 4309)
Materials, equipment, processes, and technical considerations inherent in the industrial drying of wood products. Lectures, lab exercises, plant visits.

WPS 4305. Pulp and Paper Technology. (3 cr; QP-5300 or #; SP-Jr or #)
Pulping processes, fiber refining and processing, paper manufacturing, fiber and paper properties, paper recycling, water requirements and effluent treatment. Chemical and mechanical pulping, pulp preparation, secondary fiber, de-inking, wet end additives. Lab problems and 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-5305, 5310, 5311, 5312, 5315, 5321, CE 3400, ME 3301, ME 5342 or #; SP-4305, ChEn 4001, MEW 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 student or #; SP-Jr or sr in PS&E program or grad student or #)

Biological process technology as applied to raw materials, manufacture processes, and product performance in 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 papermill expansion.

WPS 4333. Systems Approach to Residential Construction. (2 cr)

For builders, architects, and building materials suppliers. Energy, moisture control, and indoor air quality in residential buildings. Emphasis on design, construction, and operational aspects of the house to provide energy efficiency, durability, and a healthy environment. Interaction between moisture and wood products within the building system.

WPS 4334. 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 4362. 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 4401. 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 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 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 Service. (2 cr; QP-1301 or 5410 or #; SP-1301 or 4406 or #)

Directed toward forest products marketing and manufacturing professionals, architects, and commercial/residential design engineers. Physical and mechanical properties of wood-based composites and proper composite applications and installations.

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 4801. Honors Research. (2 cr; QP-Admission to WPS honors program; SP-Admission to WPS upper div honors program; A-F only)

First semester of an independent research project supervised by a faculty member.

WPS 4802. Honors Research. (2 cr; QP-Admission to WPS honors program; SP-Admission to WPS upper div honors program; A-F only)

Students complete honors thesis and present an oral report.

Work, Community, and Family Education (WCFE)

Department of Work, Community, and Family Education

College of Education and Human Development

WCFE 3011. Introduction to Technology and Public Ethics. (3 cr)

Nature of technology. Values and ethical issues related to technology. Technology and the transformation of the workplace, family, and community life.

WCFE 5002. Thinking, Learning, and Teaching in WCFE. (3 cr; A-F only)

Nature of thinking and learning in everyday life contexts of family, work, and community. Theory and practice relevant to stimulating and supporting thinking and learning in and for these contexts.

WCFE 5011. Technology and Public Ethics. (3 cr; A-F only)

Nature of technology. Values and ethical issues related to technology. Technology and the transformation of the workplace, family, and 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)
An 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; SP-\$AgEE 5341; 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; SP-\$AgEE 5351; 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)
An 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; SP-\$HRD 5821)
An 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 Education, Work, and Community. (2 cr; SP-\$HRD 5822)
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 WCFE. (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 WCFE. (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 WCFE. (1-4 cr [max 4 cr])
Content varies by offering.

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.

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 3101. Introduction to Youth Work. (2 cr; QP-1 gen psy course, 1 gen soc course; SP-1 gen psy course, 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 youth workers, 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-At least one course in ed psych or child or adolescent psych; SP-At least one course 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 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 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, youth agency or org work exper; SP-Two soc/anth courses, youth agency or org work exper)
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 soc sciences courses, exper working with youth or #; SP-Two soc sciences 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 soc sciences courses, exper with youth or #; SP-Two soc sciences courses, exper 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 soc sciences courses, exper working with youth or #; SP-Two soc sciences 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 soc sciences courses, exper working with youth or #; SP-Two soc sciences 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 soc sciences courses, exper working with youth or #; SP-Two soc sciences 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.

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

William E. Hogan II, Minnetonka, Chair
 Patricia B. Spence, Rice, Vice Chair
 Anthony R. Baraga, Side Lake
 Robert S. Bergland, Roseau
 Dallas Bohnsack, New Prague
 Warren C. Larson, Bagley
 David R. Metzgen, South St. Paul
 H. Bryan Neel III, Rochester
 Michael O'Keefe, Minneapolis
 William R. Peterson, Eagan
 Jessica J. Phillips, Bloomington
 Maureen K. Reed, Stillwater

University Administrators

Mark Yudof, President
 Robert Bruininks, Executive Vice President and Provost
 Frank B. Cerra, Senior Vice President for Health Sciences
 McKinley Boston, Jr., Vice President for Student Development & Athletics
 Carol Carrier, Vice President for Human Resources
 Sandra Gardebring, Vice President for Institutional Relations
 Eric Kruse, Vice President for University Services
 Philip Larsen, Interim Vice President for Agricultural Policy
 Christine Maziar, Vice President for Research and Dean of the Graduate School
 Mark B. Rotenberg, General Counsel

College of Agricultural, Food, and Environmental Sciences

Administration

Philip O. Larsen, Interim Vice President of Agriculture; Interim Dean of COAFES; Interim Director, Minnesota Agricultural Experiment Station

Alan G. Hunter, Associate Dean, Curricular and Student Affairs

Gerald Miller, Associate Dean, Extension

Beverly Durgan, Interim Associate Dean, Research

Jean Underwood, Director, Career Services

Mark Bultmann, Director, Student Services

Stacie Dossdall, Admissions Coordinator

Faculty

■ Agricultural, Food, and Environmental Education

Bracewell, Earl, Research Associate
 Ph.D., University of Minnesota
 Agricultural mechanics, international development, program evaluation, extension

Cardwell, Vernon, Professor
 Ph.D., Iowa State University
 Food, fiber, environment, natural resources, literacy, crop science

Joerger, Richard, Assistant Professor
 Ph.D., University of Minnesota
 Teacher and trainer preparation, instructional preferences, instructional design

Leske, Gary, Associate Professor
 Ph.D., University of Minnesota
 Experiential education, leadership, human research methods, lifework planning

Nordquist, Dale, Professor and Extension Educator
 M.S., University of Minnesota
 Agricultural finance, planning, farm business management, education

Peterson, Roland, Professor and Head
 Ed.D., University of Nebraska
 Methods of teaching, curriculum development, problem-solving, teaching

■ **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., Associate 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

Burnside, Orvin C., Professor
 Ph.D., University of Minnesota
 Alternative weed management systems

Busch, Robert H., Professor
 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., Assistant 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, Associate 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

Gaedelmann, Jon Lee, Adjunct Professor
 Ph.D., Iowa State University
 Corn breeding and genetics

Gengenbach, Burle G., Professor
 Ph.D., University of Illinois
 Corn and soybeans molecular genetics

Goodding, John A., Professor Emeritus
 Ph.D., Washington State University
 Agronomy—range plant ecology

Gronwald, John W., Professor
 Ph.D., University of Illinois
 Biological control of invasive weeds in legumes

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, Assistant 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

Lamb, Joann F., Assistant Professor
 Ph.D., University of Nebraska, Lincoln
 Forage breeding/genetics

Lueschen, William E., Professor
 Ph.D., University of Illinois
 Perennial native legumes and weed management in Canola

Marten, Gordon C., Professor
 Ph.D., University of Minnesota
 Forage production and management
 U.S. Department of Agriculture/
 Agricultural Research Service

Martin, Neal P., Professor
 Ph.D., Iowa State University
 Forage management and utilization

Muehlbauer, Gary J., Assistant Professor
 Ph.D., University of Minnesota
 Molecular genetics of wheat and barley

Naeve, Seta, Assistant Professor
 Ph.D., Iowa State University
 Soybean management

Oelke, Ervin, Professor
 Ph.D., University of Wisconsin, Madison
 Small grains, wild rice and minor crops management

Orf, James H., Professor
 Ph.D., University of Illinois
 Soybean genetics and breeding

Phillips, Ronald L., Regents' Professor
 Ph.D., University of Minnesota
 Crop cytogenetics

Porter, Paul, Associate Professor
 Ph.D., University of Illinois
 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

Berg, Robert W., Professor Emeritus
 Ph.D.
 Poultry

Boylan, William J., Professor Emeritus
 Ph.D.
 Sheep breeding

Christians, Charles, Professor Emeritus
Ph.D., Oklahoma State University
Swine and sheep extension (production management)

Conlin, Bernard J., Professor Emeritus
Ph.D., University of Minnesota
Dairy management

Crabo, Bo Gustaf, Professor Emeritus
Ph.D., Stockholm, Sweden
Animal physiology of reproduction

Crooker, Brian A., Professor
Ph.D., University of Illinois
Nutritional physiology and ruminants

Dayton, William R., Professor
Ph.D., Iowa State University
Muscle biology, growth biology

DiCostanzo, Alfredo, Assistant Professor
Ph.D., University of Minnesota
Beef nutrition and management

Donker, John D., Professor Emeritus
Ph.D.
Ruminant nutrition

El Halawani, M.E., Professor
Ph.D., University of California, Davis
Poultry endocrinology

Epley, Richard J., Professor
Ph.D., University of Missouri
Applied 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 management

Hunter, Alan G., Professor
Ph.D., Michigan State University
Animal physiology, dairy cattle reproduction

Jordan, Robert M., Professor Emeritus
Ph.D.
Sheep and horse management

Linn, James Gary, Professor
Ph.D., University of Minnesota
Dairy cattle nutrition feeding 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 environmental and management practices

O'Grady, Scott M., Professor
Ph.D., University of Illinois
Electrolyte physiology

Osborn, John W., Professor
Ph.D., Medical College of Wisconsin
Cardiac physiology

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 reproduction health

Rust, Joseph W., Professor Emeritus
Ph.D.
Calf nutrition

Seykora, Anthony J., Professor
Ph.D., North Carolina State University
Dairy genetics and management

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, Associate 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

Weaton, Jonathan E., Professor
Ph.D., Oregon State University
Reproductive endocrinology

White, Michael E., Professor
Ph.D., University of Minnesota
Muscle growth and development in meat-producing animals

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; and political economy

Credwson, 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

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

Hammond, Jerome W., Professor Emeritus
Ph.D., University of Wisconsin, Madison
Agricultural marketing and pricing

Hasbargen, Paul R., Professor Emeritus
Ph.D., Michigan State University

Hawkins, Richard O., Professor Emeritus
M.S., University of Minnesota

Homans, Frances R., Assistant Professor
Ph.D., University of California
Resource economics

Honadle, Beth W., Professor
Ph.D., Syracuse University
State and local public finance, the organization

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

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., Associate 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

Peterson, Willis L., Professor
Ph.D., University of Chicago
Production and economic development

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, 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, Assistant Professor
Ph.D., University of Wisconsin, Madison
International trade, non-tariff barriers

Smith, Rodney B., Assistant 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
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
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

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, Director of Graduate Studies
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 and Health Specialist
Ph.D., Purdue University
Agricultural safety and health, injury-preventing 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

■ **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

Holzenthall, 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., Associate Professor
Ph.D., Iowa State University
Corn and soybean integrated pest management

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., Assistant 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
Ph.D., University of Minnesota
Physical and chemical characteristics of cereals, cereal-based products

Bastian, Eric D., Associate Professor
Ph.D., Utah State University
Food proteins/enzymes, applications to milk/dairy systems

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.S., 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

Feirtag, Joellen M., Assistant Professor
Ph.D., University of Minnesota
Food safety/HACCP, ATP bioluminescence, prebiotic/probiotic physiology

Fulcher, R. Gary, Professor
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., Assistant Professor and 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

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., Assistant Professor
Ph.D., National University of Ireland
Molecular genetics of lactic acid bacteria, bacteriophage resistance

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., Lecturer
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, Cheryl 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

Ascher, Peter D., Professor
Ph.D., University of Wisconsin, Madison
Genetics/floriculture

Brown, Deborah L., Professor
M.S., University of Minnesota
Home horticulture

Carter, John V., Professor
Ph.D., Purdue University
Environmental stress

Davis, David W., Professor Emeritus
Ph.D., Oregon State University
Vegetable breeding

Desborough, Sharon, Professor Emeritus
Ph.D., University of Wisconsin
Genetics

Eisel, Mervin, Professor Emeritus
M.Ed., University of Minnesota
Extension education—horticulture/ornamentals

Erwin, John E., Associate Professor
Ph.D., Michigan State University
Floriculture

Galatowitsch, Susan M., Associate Professor
Ph.D., Iowa State University
Landscape ecology

Gardner, Gary M., Professor and Head
Ph.D., Iowa State 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 production

Lauer, Florian, Professor Emeritus
Ph.D., University of Minnesota
Plant genetics

Li, Pen Hsiang, Professor
Ph.D., Oregon State University
Environmental stress physiology

Luby, James J., Professor
Ph.D., University of Minnesota
Fruit breeding

Markhart, Albert H., Professor
Ph.D., Duke University
Environmental stress

McKinnon, Jane P., Professor Emeritus
M.S., University of Minnesota
Extension horticulture

Meyer, Mary Hockenberr, Assistant Professor
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
Landscape Arboretum director

Pedersen, Bradley W., Associate Professor
M.Ed., University of Minnesota
Landscape design and construction

Pellett, Harold M., Professor
Ph.D., Iowa State University
Woody plant breeding

Smith, Alan G., Associate Professor
Ph.D., University of Florida
Flower molecular biology

Sowokinos, Joseph R., Professor
Ph.D., University of North Dakota
Potato biochemistry

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 maintenance

Widmer, Richard E., Professor Emeritus
Ph.D., University of Minnesota
Floriculture

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

Bantari, Ernest 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
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

Meronuck, Richard A., Professor
Ph.D., University of Minnesota
Deterioration of stored grains

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 mychcohericedes

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

Carliner, Saul A., Assistant Professor
Ph.D., Georgia State University
Technical communication, documentation design

Connolly, James E., Professor Emeritus
Ph.D., University of Minnesota
Speech and managerial communication

Duin, Ann Hill, Professor
Ph.D., University of Minnesota
Multimedia modules for distance delivery, usable documents

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

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.D., Sioux Falls College
Speech

Horberg, Richard O., Professor
Ph.D., University of Minnesota
Creative writing

Kastman, 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

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
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., Associate 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.

Bell, James C., Associate Professor
Ph.D., Pennsylvania State University
Soil classification/survey

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

Davis, Kenneth J., Assistant Professor
Ph.D., University of Colorado
Climatology/atmospheric science

Graham, Peter H., Professor
Ph.D., University of Wisconsin
Soil microbiology

Grigal, David F., Professor
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

Lamb, John A., Associate Professor
Ph.D., University of Nebraska, Lincoln
Agricultural production management systems, soil properties

Larson, William E., Professor Emeritus
Ph.D.

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
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

Reece, Clive F., Assistant Professor
Ph.D., Washington State University
Water and heat in the soil-plant-atmosphere system

Rehm, George W., Professor
Ph.D., University of Minnesota
Water quality, soil fertility, fertilizer management

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 science

Rust, Richard H., Professor Emeritus
Ph.D.

Sadowsky, Michael J., Professor
Ph.D., University of Hawaii, Manoa
Biodegradation, nitrogen fixation, molecular biology

Schmitt, Michael A., Associate Professor
Ph.D., University of Illinois
Fertilizer, nitrogen, manure

Seeley, Mark W., Professor
Ph.D., University of Nebraska, Lincoln
Climatology

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

Susan Danielson, Development Officer

Craig Johnson, Curator and Coordinator, CALA Service Unit

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 American Society of Landscape Architects, and 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, Lecturer (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

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

Carmody, John, Senior Research Fellow
M.Arch., University of Minnesota
Technology

Chen, Arthur, Associate Professor
Ph.D., Georgia Institute of Technology
Architectural thinking, drawing, urbanism

Dayton, Megan, Lecturer
M.Arch., University of Virginia
Design, representation

deLaitre, 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

Ferguson, Robert, Lecturer
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

Guzowski, Mary, Associate Professor
M.Arch., University of Washington
Environmental technology, sustainable design

Hansen, Todd, Lecturer
M.Arch., University of Pennsylvania
Design

Heshmati, Ali, Lecturer
B.Arch., University of Minnesota
Design

Jacques, Tracey, Lecturer (A.I.A.)
B.Arch., University of Minnesota
Representation

James, Vincent, Adjunct Assistant 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

Mack, Robert, Adjunct Assistant Professor (F.A.I.A.)
B.Arch., University of Minnesota
Historic preservation and rehabilitation

§ Meyer, Thomas, Adjunct Associate Professor (A.I.A.)
B.Arch., University of Minnesota
Renovation adaptive re-use, residential design

Mulfinger, Dale, Adjunct Professor (A.I.A.)
B.Arch., University of Minnesota
Architect Edwin Lundie, pattern language, wall sections

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

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 Assistant 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

Satkowski, Leon, Professor
Ph.D., Harvard University
Architectural history

§ Snow, Julie, Adjunct Associate Professor (A.I.A.)
B.Arch., University of Colorado
Design, practice, construction

§ Solomonson, Katherine, Associate Professor
Ph.D., Stanford University
American and contemporary architecture

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

§ 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

Whitcomb, Thomas, Lecturer
B.Arch., University of Minnesota
Design, architectural practice, modern architectural history

Wilkins, Craig, Adjunct Assistant Professor (R.A.)
M.R.E.U.P., Columbia University
Critical spatial theory, community design strategies, disciplinary social responsibility

Yoos, Jennifer, Lecturer
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

Cartlidge, Thora, Adjunct Assistant Professor (A.I.C.P.)
M.L.A., University of Minnesota
Master planning, design

Churchward, Craig, Teaching Specialist (A.S.L.A., R.L.A.)
B.L.A., University of Minnesota
Design theory

Clemence, Roger, Professor Emeritus
M.L.A., M.Arch., University of Pennsylvania
Art of design

Favour, Joseph, Lecturer
M.L.A., Harvard University
Construction technology

Flynn, Kathe, Lecturer
M.L.A., Harvard University
Design

Galatowitsch, Susan, Assistant 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

Kopischke, Greg, 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

Mc Fadden, Kathryn J., Lecturer
M.L.A., University of Minnesota
Design, ecological restoration

Murphy, 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 W., 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

■ **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

Kathryn Hanna, Assistant Dean

Verna L. Holoman, Coordinator of Recruitment and Retention for the Life Sciences

Kathleen F. Peterson, Director of Student Services

Faculty

■ **Department of Biochemistry, Molecular Biology, and Biophysics**

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

Bardwell, Vivian, Assistant Professor
Ph.D., University of Wisconsin, Madison
Regulation of gene expression, cancer

Barry, Bridgette A., Associate Professor
Ph.D., University of California, Berkeley
Photosynthetic membrane proteins

Bernlohr, David A., Professor
Ph.D., University of Illinois, Urbana
Metabolic control, 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

Bodley, James W., Professor
Ph.D., University of Hawaii
Mechanism and regulation of protein synthesis

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, Professor
Ph.D., University of Minnesota
Lipoprotein, cholesterol and protein chemistry

Ekker, Stephen C., Assistant Professor
Ph.D., Johns Hopkins University
Determination of the animal body plan; eye patterning

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

Goldberg, Nelson D., Professor
Ph.D., University of Wisconsin, Madison
Signal transduction; bioenergetics

Hogekamp, 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, 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, Professor**
Ph.D., University of Iowa
Bioprocesses; biorecognition, energetics; proteins and enzymology
- Mauro, Laura, Assistant Professor**
Ph.D., University of Minnesota
Protein tyrosine phosphatases in cell differentiation and adhesion
- Mayo, Kevin H., Professor**
Ph.D., University of Massachusetts
Cell adhesion; protein-protein/carbohydrate interactions
- Mescher, Mathew F., Professor**
Ph.D., Harvard University
T-Lymphocyte activation; cell-cell interaction and transmembrane signaling
- Murphy, Sharon E., Assistant Professor**
Ph.D., University of Colorado
Carcinogen metabolism and exposure
- Nelsestuen, 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
- Orr, Harry, Professor**
Ph.D., Washington University
Cerebellar gene expression; mammalian development; histocompatibility genes
- Raftery, Michael A., Professor**
Ph.D., National University of Ireland, Galway
Neuronal receptors; synaptic transmission
- Roon, Robert, 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
- § Schottel, Janet L., Professor and Associate Head**
Ph.D., Washington University
mRNA stability; plant-pathogen interactions; gene expression
- Siliciano, Paul G., Associate Professor**
Ph.D., University of Pennsylvania
Nucleic acid biochemistry; molecular genetics
- Simon, Jeffrey A., Associate Professor**
Ph.D., Cornell University
Molecular biology of animal development; protein-protein and protein-DNA interactions
- Thomas, David D., Professor**
Ph.D., Stanford University
Molecular dynamics in muscle
- Towle, Howard C., Professor**
Ph.D., Michigan State University
Nutritional and hormonal regulation of mammalian gene expression
- Tsong, Tian Y., Professor**
Ph.D., Yale University
Physical biochemistry, protein-folding mechanism; energy transduction by ion pump
- Ugurbil, Kamil, Professor**
Ph.D., Columbia University
NMR studies of intact cells and tissues; metabolism
- 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
- Zarkower, David, Assistant Professor**
Ph.D., University of Wisconsin, Madison
Sex determination; regulation of gene expression in development
- **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
- Knops, Johannes M.H., Adjunct Assistant Professor**
Ph.D., Arizona State University
Ecosystem ecology and plant 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
- McKinney, D. Frank, Professor**
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**
Ph.D., Cornell University
Animal behavior and physiology
- Pusey, Anne E., Professor**
Ph.D., Stanford University
Animal behavior
- Regal, Philip J., Professor**
Ph.D., University of California, Los Angeles
Evolution, physiological ecology and behavior, and herpetology
- Schmid, William D., Professor**
Ph.D., Stanford University
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., Associate Professor and Interim Head**
Ph.D., University of Minnesota
Limnology: plankton ecology, food webs, and aquatic biogeochemistry
- Tester, John R., Professor**
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
- **Genetics, Cell Biology, and Development**
- Blumenfeld, Martin, Associate Professor**
Ph.D., Case Western Reserve University
Chromosomal organization
- Brooker, Robert J., Professor**
Ph.D., Yale University
Molecular biology of the lactose permease
- *§ Cunningham, William P., Professor**
Ph.D., University of Texas, Austin
Pollutant effects on cells
- Fan, David P., Professor**
Ph.D., Massachusetts Institute of Technology
Epidemiology of AIDS
- 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 zebra fish
- 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
- 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., Adjunct Professor**
Ph.D., Minnesota, M.D., Jefferson Medical
Genetic regulation of melanin pigmentation
- Lefebvre, Paul A., Professor**
Ph.D., Yale University
Flagellar protein assembly in *Chlamydomonas*
- § Magee, P. T., Professor**
Ph.D., University of California, Berkeley
Analysis of the genome of *Candida albicans*
- Marks, M. David, Associate Professor**
Ph.D., Purdue University
Control of cell fate and differentiation in plants

* **McKinnell, Robert G., Professor**
Ph.D., University of Minnesota
Herpes virus-induced tumor cells

O'Connor, Michael B., Professor
Ph.D., Tufts University
Cell signaling and dorsal-ventral patterning in *Drosophila*

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

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*

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*

■ **Plant Biology**

Berman, Judith G., Associate Professor
Ph.D., Weizmann Institute of Science
Chromosomal and nuclear structure and function

* **Biesboer, David D., Professor**
Ph.D., Indiana University
Ecophysiology and anatomy of angiosperms

Brambl, Robert M., Professor
Ph.D., University of Nebraska
Molecular and cellular biology

*§ **Charvat, Iris D., Associate Professor**
Ph.D., University of California, Santa Barbara
Mycorrhizal associations; fungal development; seed bank dynamics in wetlands

Doebley, John F., Professor
Ph.D., University of Wisconsin, Madison
Plant evolutionary genetics

Frenkel, Albert W., Professor Emeritus
Ph.D., University of California, Berkeley
Photosynthesis and photophosphorylation in green plants and photosynthetic bacteria

Gantt, J. Stephen, Associate Professor and Interim Head
Ph.D., University of California, Irvine
Plant molecular biology

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

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

Olszewski, Neil E., Associate Professor
Ph.D., University of Minnesota
Molecular mechanisms of hormone action; molecular genetics of DNA viruses

Rubenstein, Irwin, Professor
Ph.D., University of California, Los Angeles
Structural organization and functional regulation of genes of the maize genome

* **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, Anthony 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

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

Wackett, Lawrence P., Professor
Ph.D., University of Texas, Austin
Biodegradation, metalloenzymes, biotechnology

■ **Plant Molecular Genetics Institute**

Barry, Bridgette A., Associate 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
Mitochondrial and nuclear gene function

Das, Anath, Professor
Ph.D., University of Nebraska, Lincoln
Trans-kingdom DNA transfer: plant-microbe interactions

Doebley, John F., Professor
Ph.D., University of Wisconsin, Madison
Plant evolutionary genetics

Gantt, J. Stephen, Associate Professor
Ph.D., University of California, Irvine
Gene expression in plants

Gengenbach, Burle G., Professor
Ph.D., University of Illinois
Molecular genetics of developmental and biochemical processes

Lefebvre, Paul A., Professor
Ph.D., Yale University
Flagellar protein assembly in *Chlamydomonas*

Marks, M. David, Associate Professor
Ph.D., Purdue University
Control of cell fate and differentiation in plants

May, Georgiana, Associate Professor
Ph.D., University of California, Berkeley
Evolution of fungi; their 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
Responses to gibberellins

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

§ **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
Biochemical genetics of plants

Szabo, Les, Adjunct Assistant 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 phosphorous stress

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 Peifer, Education Specialist

Jane Phillips, Coordinator of CBS Instructional Labs

Contributing Faculty From Other University Units

■ **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

Conklin, Kathleen F., Associate Professor
Ph.D., Tufts University
Retroviruses, oncogenesis, and gene regulation

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*

Faras, Anthony, Professor
Ph.D., University of Colorado
Tumor viruses, oncogenesis, and gene transfer

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**
Ph.D., Johns Hopkins University
Mechanisms of regulation of fermentation pathways, and development of *Clostridium*

Sadowsky, Michael, Professor
Ph.D., University of Hawaii
Soil microbiology, and *Rhizobium* and *Brachyrrhizobium*-host interactions

Schiff, Leslie A., Associate Professor
Ph.D., Tufts University
Virus-host cell interactions and viral protein structure-function

Schlievert, Patrick M., Professor
Ph.D., University of Iowa
Immunobiology, and genetic control of 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

■ Neuroscience—Medical School

Ashe, James, Associate Professor
M.D., University College Dublin, Ireland
Neural control of movement

Boland, Linda M., Assistant Professor
Ph.D., University of North Carolina, Chapel Hill
Molecular physiology of ion channels

Carroll, Marilyn E., Professor
Ph.D., Florida State University
Behavioral pharmacology and drug dependence

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

El-Fakahany, Esam, Professor
M.D., Mayo Graduate School of Medicine
Receptor regulation; receptor coupling to second messengers; aging; Alzheimer's disease; nitric oxide

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

Gomez, Christopher M., Associate Professor
M.D., Ph.D., University of Chicago
Ion channel disorders and neurodegenerative disease

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

Hsiao, Karen K., Associate Professor
M.D., Harvard Medical School, Ph.D., Massachusetts Institute of Technology
Molecular biology of aging and dementia; in vivo and in vitro studies

Iadecola, Costantino, Professor
M.D., University of Rome Medical School
Neurobiology of cerebral circulation

Kajander, Keith C., Associate Professor
D.D.S., Ph.D., University of Minnesota
Spinal nociceptive pathways in normal and neuropathic conditions

Larson, Alice A., Professor
Ph.D., University of Minnesota
Neurochemical mediation of pain transmission (substance P excitatory amino acids nitric oxide neurotrophins)

Letourneau, Paul C., Professor
Ph.D., Stanford University
Developmental neurobiology

Levine, Allen S., Professor
Ph.D., University of Minnesota
Energy intake and energy expenditure

Mantyh, Patrick W., Professor
Ph.D., University of California, San Francisco
Cellular and molecular neurobiology

McLoon, Linda K., Associate Professor
Ph.D., University of Illinois, Chicago
Neuro-ophthalmology; muscle development, injury, and regeneration

McLoon, Steven C., Professor
Ph.D., University of Illinois, Chicago
Development and regeneration of axonal connections

Mesce, Karen A., Associate Professor
Ph.D., University of Oregon, Eugene
Neural systems and neurodevelopment

Newman, Eric A., Professor
Ph.D., Massachusetts Institute of Technology
Physiology and functions of glial cells

Poppele, Richard E., Professor
Ph.D., University of Minnesota
Neurophysiology and motor control

Ross, M. Elizabeth, Associate Professor
M.D., Ph.D., Cornell University Medical College
Molecular neurodevelopment; molecular events determining cell fate and organization in mammalian brains

Santi, Peter A., Professor
Ph.D., Florida State University
Functional anatomy of the inner ear

Seybold, Virginia S., Professor
Ph.D., University of Minnesota
Neuroanatomy; neuropharmacology; pain; autonomic nervous system; neuroendocrines

Simone, Donald A., Associate Professor
Ph.D., City University of New York
Neural mechanisms of pain sensation

Soechting, John F., Professor
Ph.D., Cornell University
Motor control neurophysiology

Sorenson, Peter W., Professor
Ph.D., University of Rhode Island
Neural and endocrine bases of chemoreception, especially in fish

Sparber, Sheldon B., Professor
Ph.D., University of Minnesota
Neuropsychopharmacology

Ugurbil, Kamil, Professor
Ph.D., Columbia University, New York
Metabolic and functional imaging in the brain using magnetic resonance

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, preclinic and advanced instrumentation, ergonomics

Stoltenberg, Jill L., R.D.H., Associate Professor
M.A., University of Minnesota
Periodontal diseases, dental caries, fluoride, clinical dental hygiene

Young, Lynda J., R.D.H., Associate Professor and Director, Continuing Dental Education
M.A., University of Minnesota
Continuing dental education

College of Education and Human Development

Administration

Steven R. Yussen, Dean

Robert C. Serfass, Associate Dean for Academic Affairs

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

To be announced, 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

Johnson, Roger T., Professor
Ed.D., University of California, Berkeley
Elementary and science education, cooperative learning

Lambrech, 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

Narváez, Darcia F., Assistant Professor
Ph.D., University of Minnesota
Moral development, multicultural education

§ Phinney, Margaret, Assistant Professor
Ed.D., University of Massachusetts
Early 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, Dianne 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**

Alkire, Gary F., Associate Professor
Ed.D., Michigan State University
Educational facilities planning, principalship, personnel administration

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, equity and finance

§ Bagley, Ayers L., Professor
Ph.D., Indiana University
History and philosophy of education, iconography of education

Chapman, David C., Professor
Ph.D., Syracuse University
Education development, program evaluation, education policy

§ Cogan, John J., Professor
Ph.D., The Ohio State University
Comparative and international development education

Daniel, Philip T. K., Professor
Ed.D., University of Illinois; J.D., Northern Illinois University
Law and schools, higher education, special education, technology, research and policy

Harkins, Arthur M., Associate Professor
Ph.D., University of Kansas
Educational and workplace futures, knowledge-based education, anticipatory leadership

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

King, Jean A., Associate Professor
Ph.D., Cornell University
School change, program evaluation, action research

Lewis, Darrell R., Professor
Ph.D., Louisiana State University
Economics of education, economic evaluation, equity issues

Louis, Karen Seashore, Professor
Ph.D., Columbia University
Organizational theory, planned change, schools as workplaces, leadership

Lundy-Dobbert, Marion M., Professor
Ph.D., University of Wisconsin
Anthropology of education, general systems theory, ethnographic research methods

Mestenhauser, Josef A., Professor
Ph.D., University of Minnesota
International education, culture learning theory, social and cultural change

§ 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

Stout, Karen Evans, Assistant Professor
Ph.D., University of Minnesota
Instructional leadership, educational policy and instructional practice

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
Interprofessional collaboration, staff development, school restructuring, 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

Hansen, L. Sunny, Professor
Ph.D., University of Minnesota
Career development, counseling women, multicultural counseling, school counseling and guidance

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., Associate 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

Davis, Marsha, Associate Professor
Ph.D., University of Minnesota
Evaluation, youth and family behavior change programs, mixed-model analysis, measurement

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

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

Maruyama, Geoffrey M., Professor
Ph.D., University of Southern California
Diversity in education, educational applications of social psychology

Narváez, Darcia F., Assistant Professor
Ph.D., University of Minnesota
Multicultural education, moral development, teacher development

Pellegrini, Anthony, Professor
Ph.D., The Ohio State University
Children's play, observational research methods

§ Rest, James R., Professor
Ph.D., University of Chicago
Moral development and education, personality and social development

§ Samuels, S. Jay, Professor
Ed.D., University of California
Learning and cognition, psychology of values, character education

Tennyson, Robert D., Professor
Ph.D., Brigham Young University
Adult learning, instructional psychology and technology, educational technology

§ van den Broek, Paulus, Professor
Doctoraals, University of Leiden—The Netherlands, Ph.D., University of Chicago
Performance of complex cognitive tasks (learning, reading, remembering, reasoning)

School Psychology

Christenson, Sandra L., Associate 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
Moderate/severe disabilities

Knowlton, Marie, Associate Professor
Ph.D., Cornell University
Visual impairments

McEvoy, Mary A., Professor
Ph.D., University of Tennessee
Early childhood/special education

Reichle, Joe, Professor
Ph.D., University of Wisconsin
Communicative disorders

Rose, Susan, Associate Professor
Ph.D., The Ohio State University
Deaf/hard-of-hearing

Rynders, John E. Professor
Ph.D., University of Wisconsin
Mild/moderate intellectual disabilities

Taborn, John, Associate Professor
Ph.D., University of Minnesota
Cultural diversity

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

Puncochar, 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

Kinesiology

§ Burton, Allen W., Associate 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, Jurgen, 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, 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 P., Assistant Professor
M.A., University of South Dakota
Physical activity programming, management, coaching, 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
Recreational sports, sports facility management

Buysse, JoAnn, Lecturer
Ph.D., University of Minnesota
Gender issues in sport, social psychology of sport

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

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

Copa, George H., Professor
Ph.D., University of Minnesota
Aims and curriculum of work, community, family education

Joerger, Richard, Assistant Professor
Ph.D., University of Minnesota
Agricultural, food, and environmental education

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

Lambrech, 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

§ Pihlal, 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

Barbara R. S. Foster, Senior Administrative Director

Faculty

Adamson, William Delancey (Del), Associate Professor
Ph.D., University of Minnesota
Literature, world religions, film and the arts

*** Albrecht, Lisa D., Associate Professor**
Ph.D., State University of New York at Buffalo
Freshman 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, computer-assisted
instructional methods

* **Buckley, Thomas C., Associate
Professor**
M.A., University of Minnesota
History, military history

* **Collins, Terence G., Professor**
Ph.D., University of Minnesota
Basic writing, disability studies,
technology in higher education

§ **delMas, Robert C., Assistant
Professor**
Ph.D., University of Minnesota
Statistics, mathematics, problem solving,
technology enhanced learning

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
American literature, multicultural/
women's literature, sea literature, writing

*§ **Hatch, Jay T., Associate Professor**
Ph.D., University of Minnesota
Conservation biology, environment,
natural history, aquatic ecology

Higbee, Jeanne L., Associate Professor
Ph.D., University of Wisconsin, Madison
Developmental education

James, Patricia, Assistant Professor
Ph.D., University of Minnesota
Teaching and learning artistic creativity

Jensen, Murray S., Assistant Professor
Ph.D., University of Minnesota
Biology, evolution, anatomy and
physiology, constructivism

* **Johnson, Allen B., Associate Professor**
Ph.D., University of Minnesota
Physical science, natural environment and
weather

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
General legal studies, government and
politics

**Kinney, Donald Patrick, Assistant
Professor**
Ph.D., University of Minnesota
Mathematics education

* **Koch, Laura Coffin, Associate
Professor**
Ph.D., University of Minnesota
Mathematics, mathematical learning of
nontraditional students

*§ **Kroll, Patrick A., Associate Professor**
M.A., University of Minnesota
Business studies, accounting

Latts, Sander M., Professor
Ph.D., University of Minnesota
Human development, marriage and family
relationships

*§ **Robertson, Douglas F., Professor**
Ph.D., University of Minnesota
Developmental mathematics, computing

* **Sirc, Geoffrey M., Associate Professor**
Ph.D., University of Minnesota
Basic writing, hip-hop

**Taylor, David V., Associate Professor
and Dean**
Ph.D., University of Minnesota
History, history of African people

Tohen, 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
Introductory psychology, counseling,
curriculum evaluation

Wilcox, Kimerly J., Assistant Professor
Ph.D., University of Cincinnati
Biological science, science education for
girls with disabilities

Yahnke, Robert E., Professor
Ph.D., University of Wisconsin, Madison
Film, humanities, and the arts, with
emphasis in aging

College of Human Ecology

Administration

Mary E. Heltsley, Dean

Daniel Detzner, Associate Dean of
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

Becky Love Yust—Housing Studies

Denise Guerin—Interior Design

Elaine Asp, Louise Mullan—Nutrition

Kim Johnson—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

Bye, Elizabeth, Lecturer
Ph.D., University of Minnesota
Textile product development, computer-
aided design, sizing/fit

Chu, Sauman S., Assistant Professor
Ph.D., University of Minnesota
Multiculturalism/design education, cross-
cultural differences in design

**DeLong, Marilyn R., Buckman
Professor of Design Education**
Ph.D., The Ohio State University
Aesthetics and socio-psychological
aspects of clothing

Eicher, Joanne B., Regents' Professor
Ph.D., Michigan State University
Dress as communication, art form, and
identity

**Gahring, Sherri A., Assistant Professor,
Extension Specialist**
M.S., Iowa State University
Protective clothing, special needs; textile/
apparel business development

**Ginthner, Delores A., Assistant
Professor, Director of Undergraduate
Studies**
M.A., University of Minnesota
Lighting design, environmental issues, life
safety in design

Goetz, Edward G., Associate Professor
Ph.D., Northwestern University
Government housing policies, nonprofits'
role in housing production

* **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 analyses, user group
psychological/physical needs

**Martinson, Barbara E., Assistant
Professor**
Ph.D., University of Minnesota
Information design/communication theory/
visual literacy/aesthetic issues

McCarthy, Steven, Associate Professor
M.F.A., Stanford University
Artist's books, interactive multimedia,
design history

Olson, Wanda W., Professor
M.S., University of Minnesota
Housing technology and user needs and
practices

**Shen, Lindsay, Director, The Goldstein
Museum of Design**
Ph.D., University of St. Andrews, Scotland
History, furniture/decorative arts; regional/
vernacular material culture

**Williams, Gloria M., Associate
Professor**
Ph.D., University of Minnesota
Clothing practices of people of color,
clothing/human behavior

**Watson, Stephanie A., Assistant
Professor**
Ed.D., University of Arkansas
History of interiors, learning styles,
flammability of interior fabrics

**Yust, Becky Love, Associate Professor,
Head**
Ph.D., The Ohio State University
Residential technology, human factors in
kitchen planning

Ziebarth, Ann C., Assistant 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

Gloria Williams, Textiles Curator

■ Family Education

McClelland, Jerry, Associate Professor
Ph.D., Iowa State University
Parent, family and teacher education;
alternative research methods

Plihal, Jane, Associate Professor
Ph.D., University of Chicago
Family and teacher education; research
theory; alternative research methods

**Rossmann, Marilyn, Associate
Professor**
Ph.D., University of Minnesota
Parenting and parent education; work and
family relationships

Thomas, Ruth, Professor
Ph.D., University of Minnesota
Higher-order thinking skills; teacher and
parent education

■ 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

Olson, David H., Professor
Ph.D., Pennsylvania State University
Marital and family assessment, family strengths and diversity

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

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

Zimmerman, Shirley, Professor
Ph.D., University of Minnesota
Family policy, state expenditures, families in political context

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
Ph.D., University of Minnesota
Physical/chemical characteristics of cereals, cereal-based products

Bastian, Eric D., Associate Professor
Ph.D., Utah State University
Food proteins/enzymes, applications to milk/dairy systems

Brady, Linda J., Professor
Ph.D., Michigan State University
Effects of diet on intestinal microflora and health

Busta, Frank F., Professor
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

Feirtag, Joellen M., Assistant Professor
Ph.D., University of Minnesota
Food safety/HACCP, ATP bioluminescence, prebiotic/probiotic physiology

*** Fulcher, R. Gary, Professor**
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., Assistant Professor
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

*** Labuza, Theodore P., Professor**
Ph.D., Massachusetts Institute of Technology
Shelf life/chemical deterioration of foods, moisture transport

McKay, Larry L., Professor
Ph.D., Oregon State University
Food fermentations/genetics/biotechnology of lactic acid bacteria

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., Assistant Professor
Ph.D., University of College Cork, Ireland
Molecular genetics of lactic acid bacteria, bacteriophage resistance

Reicks, Marla M., Associate Professor
Ph.D., Iowa State University
Diet/cancer prevention, nutrition education for low income groups

Reineccius, Gary A., Professor
Ph.D., Pennsylvania State University
Analysis of food flavors, losses during spray drying

Sapakie, Sidney F., Senior Fellow
M.B.A., University of Minnesota
Product development, food processing

Schafer, H. William, Associate Professor
Ph.D., University of Wisconsin, Madison
Food safety/quality; naturally occurring antimicrobial compounds/antioxidants

Schmidl, Mary K., Lecturer
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**

Ahlquist, 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, Assistant Professor
Ph.D., University of Chicago
Child abuse and neglect, violence against women, qualitative research methods, children and families in poverty

Beker, Jerome, Professor Emeritus
Ed.D., Columbia University
Group care programs for youth, preparation/professionalization of youth workers, youth organizations

Bradshaw, William, Education Specialist
Ph.D., University of Southern California
Psychopathology, victim-offender mediation, cognitive-behavioral therapy, group therapy

Brookins, Geraldine, Professor
Ph.D., Harvard University
African-American families, child welfare and youth policy, dual-career families

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

Edleson, Jeffrey, Professor
Ph.D., University of Wisconsin, Madison
Social work research methods, family violence, electronic information

Evans, Theora, Assistant Professor
M.P.H., Ph.D., University of Minnesota
Child welfare, maternal and child health delivery systems

Gilgun, Jane F., Professor
Ph.D., Syracuse University
Child welfare, child sexual abuse, development of violent behavior

Hollister, C. David, Professor
Ph.D., University of Michigan
Program evaluation, organizational analysis of social services, substance abuse and child welfare

Johnston, Nancy, Coordinator and Instructor
M.S.W., University of Minnesota
Child welfare, social policy, supervision and consultation

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

Macy, Jane, Education Specialist
M.S.S.W., University of Wisconsin, Madison
Distance education, feminist social work practice, adult education

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

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, Assistant 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, Education Specialist
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, Associate Professor
Ph.D., University of Minnesota
Mediation and conflict resolution, criminal justice, victim issues, violence prevention

Van Slyke, Victoria, Coordinator
Ph.D., University of Michigan
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

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

Guillermo Rojas, 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, Alex, 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, Assistant Professor
Ph.D., Iowa State University
History, American Indian boarding schools, multiculturalism

Choy, Catherine
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, Associate 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, Associate 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, U.S.

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, U.S.

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

Katsiaficas, Mary Diane, Professor
M.F.A., University of Washington, Seattle
Drawing, painting

Krepps, Jerald, Associate Professor
M.F.A., Indiana University
Printmaking

Kuhr, Alexis, Assistant Professor
M.F.A., Stanford University
Drawing, painting

Lane, Thomas, Associate Professor
M.F.A., Pennsylvania State University
Ceramics

Lucey, Susan, Associate Professor
M.F.A., Temple University
Sculpture

§ 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

■ **Chinese**

Chen, Jue, Assistant Professor
Ph.D., Princeton University
Pre-modern Chinese fiction and drama

Chen, Yu-shih, Professor
Ph.D., Yale University
Chinese prose tradition and 20th-century literature

Wang, Stephen, Professor
Ph.D., University of Washington
Chinese language and linguistics

■ **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

■ **Communication Disorders**

Brady, Nancy, Assistant Professor
Ph.D., University of Kansas
Language acquisition, developmental disabilities

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

Davis, Julia, Professor Emeritus
Ph.D., University of Southern Mississippi
Rehabilitative audiology

Doyle, Shirley, Clinical Specialist
M.A., University of Maryland
Language disorders

Glaze, Leslie, Associate Clinical Specialist
Ph.D., University of Wisconsin
Voice disorders, laryngectomy

Gundel, Jeanette, Adjunct Professor
Ph.D., University of Texas
Syntax, semantics, pragmatics

Haroldson, Samuel, Professor
M.A., University of Minnesota
Stuttering, laryngectomy

Hinderscheit, Linda, Associate Clinical Specialist
M.A., University of Minnesota
Language disorders, populations with severe disabilities

Kennedy, Mary, Assistant Professor
Ph.D., University of Washington
Neurological disorders of communication

Margolis, Robert, Adjunct Professor
Ph.D., University of Iowa
Auditory evoked potentials, middle ear function

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

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

Starr, Clark, Professor Emeritus
Ph.D., Northwestern University
Cleft palate, voice disorders

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
Psychoanalytic theory, theories of technology and 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, 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 studies, musicology, queer studies

■ **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

Copeland, Rita, Professor

Ph.D., University of California, Berkeley
Medieval studies

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

Efenbein, 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**

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, post-colonial 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, 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
Literary theory, cultural studies, film, popular music

Rabinowitz, Paula, Professor

Ph.D., University of Michigan, Ann Arbor
20th-century American writers; women; minorities; Marxist, feminist criticism

Raley, Rita, Assistant Professor

Ph.D., University of California
Hypertext and Internet, postcolonial literature, poststructuralist and postmodernist theory

§ **Reed, Peter, Professor**

Ph.D., University of Washington
20th-century British novel, poetry and drama

Ross, Donald, Professor

Ph.D., University of Michigan
American "Renaissance," theory of novel, computers in writing instruction

Roth, Marty, Professor

Ph.D., University of Chicago
19th-century American fiction, popular culture, film, culture and addiction

Scandura, Jani, Assistant Professor

Ph.D., University of Michigan
American, British literature; cultural studies; literary, architectural, feminist theory

Schumacher, Julie, Associate Professor

M.F.A., Cornell University
Fiction writing, contemporary fiction, novels, short stories

Solotaroff, Robert, Professor

Ph.D., University of Chicago
American literature, theory of fiction, modernism

Sprengnether, Madelon, Professor

Ph.D., Yale University
Feminist criticism, Renaissance literature, women writers, creative writing

Stekert, Ellen, Professor

Ph.D., University of Pennsylvania
American folksong; lesbian folklore; "disability" folklore; horror genres

*§ **Sugnet, Charles, Associate Professor**

Ph.D., University of Virginia
Shakespeare, novels, feminist criticism, American nature writing, Romantic period

Watkins, John, Associate Professor

Ph.D., Yale University
Medieval and Renaissance literature, poetics

Weinsheimer, Joel, Professor

Ph.D., Ohio University
Late 18th-century literature (especially Johnson, Austen), literary theory

■ **English as a Second Language**

Cohen, Andrew, Professor

Ph.D., Stanford University
Applied linguistics, second-language acquisition

Johnston, Bill, Assistant Professor

Ph.D., University of Hawaii at Manoa
Language teacher education, classroom research, discourse analysis

§ **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, Mária, Associate Professor
Ph.D., Yale University
20th-century literature; theater; literary, cultural theory; gender

Ferlito, Susanna, Assistant Professor
Ph.D., University of California, Los Angeles
19th-century Italian literature

Kerr, Betsy, Associate Professor
Ph.D., Indiana University
French linguistics, applied linguistics, pragmatics

Lemoine, Kevin, Assistant Professor
Ph.D., University of Texas
French linguistics, pragmatics, sociolinguistics, second-language education

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

Waldauer, Joseph, Professor
Ph.D., Columbia University
18th-century narrative and theater

■ 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 agrilimatology, development

Rice, John, Professor
Fil. lic., University of Uppsala
Historical geography, Europe (especially Scandinavian states and Finland)

Samatar, Abdi, Associate Professor
Ph.D., University of California, Berkeley
Third World development and regional planning; East Africa

Schwartzberg, Joseph, Professor
Ph.D., University of Wisconsin
South and Southeast Asia, political geography, historical cartography

Scott, Earl, Professor
Ph.D., University of Michigan
Cultural and economic geography, Africa

Sheppard, Eric, Professor
Ph.D., University of Toronto
Economic geography, political economy, quantitative methods, philosophical foundations

Skaggs, Richard, Professor
Ph.D., University of Kansas
Climatology, physical geography, long-term temperature trends, drought

Squires, Roderick, Associate Professor
Ph.D., University of Durham, England
Public land policy

Till, Karen E., Assistant Professor
Ph.D., University of Wisconsin, Madison
Urban, social theory, historic landscapes, Europe, North America

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
Danish language, modern Danish and Swedish literature, European humanism

Joeres, Ruth-Ellen Boetcher, Professor
Ph.D., Johns Hopkins University
18th- and 19th-century literature, women's history and literature

Liberman, 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 theory, feminism

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

Oosterhoff, Jenneke A., Assistant Education Specialist
Ph.D., Washington University
Dutch language/literature, Dutch and German film, turn-of-century Austria

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

Sinks, I. Tuulikki, Teaching Specialist
M.A., University of Arizona
Finnish language and culture

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
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, Assistant Professor
Ph.D., University of Wisconsin, Madison
Colonial Latin America, women

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

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
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 U.S., Asian-American,
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

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

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, Assistant 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)

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

Pomata, Gianna, Associate Professor
Ph.D., University of Florence, Italy
European cultural history

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
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

Spear, Allan, Associate Professor
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, Assistant Professor
Ph.D., University of California, San Diego
Modern China

Welke, Barbara, Assistant Professor
Ph.D., University of Chicago
19th- and 20th-century U.S. legal,
constitutional, and women's history

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, 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, photography, motion
pictures

Gerald, J. Edward, Professor Emeritus
Ph.D., University of Minnesota
Media law

*** Gillmor, Donald, Professor Emeritus**
Ph.D., University of Minnesota
Media and constitutional law,
communication agencies as social
institutions

Hansen, Kathleen, Associate Professor
M.A., M.L.S., University of Wisconsin,
Madison
Information access/communication,
sociology of news, bibliographic retrieval

Jones, Robert, Professor Emeritus
Ph.D., University of Minnesota
Advertising

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

Tichenor, Phillip, Professor Emeritus
Ph.D., Stanford University
Theory and methodology, science
journalism, public opinion

Tims, Albert, Associate Professor
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

Artymiwn, 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, 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, Associate Professor
Ph.D., Harvard University
Historical musicology, 19th-20th centuries, Debussy studies

Haack, Paul, Professor
Ph.D., University of Wisconsin
Music education

Harkness, Kelley, Assistant Professor
Ph.D., University of Illinois, Urbana-Champaign
Musicology

Hepokoski, James, Professor
Ph.D., Harvard University
19th-20th century musicology, symphonic structures, critical theory

Jackson, Donna, Professor
Ph.D., Harvard University
Historical musicology, medieval and Renaissance

Kagan, Alan, Associate Professor Emeritus
Ph.D., Indiana University
Ethnomusicology of China, 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, Corey, 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, Associate 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

McNab, Duncan, Associate Professor
D.M.A., University of California, Los Angeles
Piano, piano literature

Meza, Fernando, Assistant 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

Schultz, Stephen, Associate Professor
Ph.D., Northwestern University
Music education

Shaw, Paul, Assistant 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, Associate Professor
D.M., Northwestern University
Voice (tenor), pedagogy

Weller, Lawrence, Associate Professor
M.M., University of Illinois
Voice (baritone), diction, vocal literature

Zaimont, Judith, Professor
M.A., Columbia University
Composition, theory

■ *Philosophy*

Bowie, Norman E., Professor
Ph.D., University of Rochester
Political philosophy, corporate responsibility, ethics

Dahl, Norman, Professor
Ph.D., University of California, Berkeley
Moral philosophy, ancient philosophy

*** Dolan, John M., Associate Professor**
Ph.D., Stanford University
Philosophy of language, epistemology, medical ethics

Eaton, Marcia M., Professor
Ph.D., Stanford University
Aesthetics

Giere, Ronald, Professor
Ph.D., Cornell University
Philosophy of science

Gunderson, Keith, Professor
Ph.D., Princeton University
Philosophy of mind, aesthetics, 17th- and 18th-century philosophy

*** Hanson, William, Professor**
Ph.D., Yale University
Logic, philosophy of logic

Hellman, Geoffrey, Professor
Ph.D., Harvard University
Philosophy of natural science, mathematics and logic, aesthetics

Holtman, Sarah, Assistant Professor
Ph.D., University of North Carolina
Ethics, political philosophy, philosophy of law

Hopkins, Jasper, Professor
Ph.D., Harvard University
Ancient and medieval philosophy, philosophy of religion

Kac, Michael, Professor
Ph.D., University of California, Los Angeles
Philosophy of language, formal theories of language

§ Lewis, Douglas, Professor
Ph.D., University of Iowa
17th- and 18th-century philosophy, metaphysics

Longino, Helen, Professor
Ph.D., Johns Hopkins University
Feminist theories of knowledge, philosophy of science, social epistemology

Mason, H. E., Professor
Ph.D., Harvard University
Moral and political philosophy, philosophy of language

Owens, Joseph, Professor
Ph.D., University of California, Los Angeles
Philosophy of mind, language, metaphysics

§ Peterson, Sandra, Professor
Ph.D., Princeton University
Ancient philosophy, moral philosophy

§ Root, Michael, Associate Professor
Ph.D., University of Illinois
Philosophy of language, philosophy of social science

Savage, C. Wade, Professor
Ph.D., Cornell University
Philosophy of science, epistemology, philosophy of psychology

§ Scheman, Naomi, Professor
Ph.D., Harvard University
Feminist theory, epistemology, Wittgenstein

Tiberius, Valerie, Assistant Professor
Ph.D., University of North Carolina at Chapel Hill
Moral philosophy, metaethics, practical reason

Wallace, John, Professor
Ph.D., Stanford University
Philosophy of language

Waters, C. Kenneth, Associate Professor
Ph.D., Indiana University
Philosophy of science, epistemology, philosophy of biology

■ *Political Science*

§ Dietz, Mary, Professor
Ph.D., University of California, Berkeley
Development of political thought

Disch, Lisa, Associate Professor
Ph.D., Rutgers University
Political theory

*** § Duvall, Raymond, Professor**
Ph.D., Northwestern University
International relations, comparative political economy

Estevez-Abe, Margarita, Assistant Professor
Ph.D., Harvard University
Japanese politics, political economy

*** § Farr, James, Professor**
Ph.D., University of Minnesota
Political theory

Flanigan, William, Professor
Ph.D., Yale University
Political behavior

Fogelman, Edwin, Professor
Ph.D., Princeton University
Political theory

*** § Freeman, John, 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

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

Kvavik, Robert, Professor
Ph.D., Stanford University
Political organizations, Scandinavia

§ Nimitz, August, Associate Professor
Ph.D., Indiana University
Africa, comparative and community politics

Oren, Ido, Assistant Professor
Ph.D., University of Chicago
International relations

Price, Richard, Assistant 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

*** 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

*** Smith, Steven, Professor**
Ph.D., University of Minnesota
Legislative and executive process

*** Sullivan, John, 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
Ph.D., Tulane University
Human learning and memory, cognition, psychology of instruction

Frazier, Patricia, Associate Professor
Ph.D., University of Minnesota
Counseling and social psychology, coping with stressful life events

Garmezy, Norman, Professor Emeritus
Ph.D., Iowa State University
Clinical psychology, personality, developmental psychopathology, childhood stressors, resistance and resilience

*** Gonzales, Marti, Associate Professor**
Ph.D., University of California, Santa Cruz
Accountability, applied social psychology, impression management, medical compliance

Grove, William, Associate Professor
Ph.D., University of Minnesota
Mood disorders, schizophrenia, behavior genetics, assessment

Hansen, Jo-Ida, Professor
Ph.D., University of Minnesota
Vocational and cross-cultural interest measurement, inventory construction, career development

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
Eating disorders, stress and coping in extreme situations

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, Assistant Professor
Ph.D., Harvard University
Human memory, vision, and learning, cognitive neuroscience

McGue, Matthew, Professor
Ph.D., University of Minnesota
Behavior genetics, individual differences, substance abuse, aging

Meehl, Paul, Regents' Professor Emeritus
Ph.D., University of Minnesota
Clinical, psychometric methods, forensics, taxometrics, philosophy

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, counseling, 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
Political sociology, historical sociology

Anderson, Ronald, Professor
Ph.D., Stanford University
Methodology, technology, education, micro-computing

Bian, Yanjie, Associate Professor
Ph.D., State University of New York, Albany
Stratification/mobility, statistics and methods, comparative sociology, social networks

Boyle, Elizabeth, Assistant Professor
Ph.D., Stanford University
Law, crime, deviance; gender; political sociology

Broadbent, Jeffrey, Associate Professor
Ph.D., Harvard University
Social movements; environmental sociology; development, change; Japan, Asia

***§ Brustein, William, Professor**
Ph.D., University of Washington
Political, historical sociology; stratification; social movements, change, social theory

*** Cooperman, David, Professor**
Ph.D., University of Minnesota
Comparative sociology, conflict, economy and society, Scandinavian societies

Donohue, George, Professor Emeritus
Ph.D., Washington State University
Social theory, social organization, community, rural sociology

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
Death, AIDS, life course, social stratification

Galaskiewicz, Joseph, Professor
Ph.D., University of Chicago
Organizations, community, social networks

Hartmann, Douglas, Assistant Professor
Ph.D., University of California, San Diego
Race/ethnicity, cultural sociology, social change

Johnson, Arthur, Professor Emeritus
Ph.D., University of Minnesota
Sociology of religion, family, applied sociology

Kennedy, Robert, Associate Professor Emeritus
Ph.D., University of California, Berkeley
Demography, population, life course, AIDS research

Knoke, David, Professor
Ph.D., University of Michigan
Organizations, methods and statistics, social networks

Kruttschnitt, Candace, Professor
Ph.D., Yale University
Criminology, women offenders, violent crime

Laslett, Barbara, Professor
Ph.D., University of Chicago
Historical sociology, family, sociology of gender, theory

Leik, Robert, Professor
Ph.D., University of Wisconsin, Madison
Mathematical models, methods and statistics, family

Macmillian, I. Ross, Assistant Professor
Ph.D., University of Toronto
Research methodology, social statistics, criminology, life course studies

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, theory, quantitative methods

McLeod, Jane, Associate Professor
Ph.D., University of Michigan
Psychiatric epidemiology, medical sociology, quantitative methods, family

*** McTavish, Donald, Professor**
Ph.D., University of Iowa
Methods, statistics, computer text analysis, gerontology, organizational simulation

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
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Human sexuality, gender roles, family, theory construction

Savelsberg, Joachim, Associate Professor
Dr. rer. pol., University of Trier, Germany
Law, criminology, comparative historical sociology

Spitzer, Stephan, Associate Professor Emeritus
Ph.D., University of Washington
Social psychology, deviant behavior, visual sociology

Uggen, Christopher, Assistant Professor
Ph.D., University of Wisconsin
Criminology, juvenile delinquency, deviance, work and labor markets

Ward, David, Professor
Ph.D., University of Illinois
Criminology, penology, law, comparative penal policy, policing

■ South Asian Languages

§ Junghare, Indira, Professor
Ph.D., University of Texas
Marathi, Hindi, linguistics, culture and civilization of India

■ Spanish and Portuguese

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
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Spanish-American literature: narrative, poetry, essay, literary theory, semiotics

Klee, Carol, Associate Professor
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Hispanic linguistics, applied linguistics and sociolinguistics

Machín, Horacio, Assistant Professor
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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
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Spanish-American literature: Mexico, Caribbean, Central America; feminism

Ocampo, Francisco, Associate Professor
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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
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History of Spanish literature: early to modern times

■ Speech-Communication

Albert, Rosita, Associate Professor
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Intercultural communication, international relations, cross-cultural methods, health communication

Bormann, Ernest G., Professor Emeritus
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Rhetorical theory, American public address; small group communication

Browne, Donald, Professor
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Comparative international media, media and minorities, historical research methodology

Campbell, Karlyn Kohrs, Professor
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Rhetorical theory/criticism, women in communication, presidential rhetoric

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Communication theory, small group and organization decision-making

Jensen, J. Vernon, Professor Emeritus
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British public address, argumentation, ethics, rhetoric in Asia

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Interpersonal communication and aggression, persuasion and social influence, health, methodology

Rarick, David, Associate Professor
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Communication theory, media ethics, audience analysis, telecommunications media

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Contemporary rhetorical theory, classical rhetoric, public address, argumentation

§ Scott, Robert, Professor
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Rhetorical theory, public address criticism, value implications in research

Shapiro, George L., Professor Emeritus
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Leadership, organizational and interpersonal communication, communication between subcultures

Sheldon, Amy, Professor
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First- and second-language acquisition, discourse analysis, gender

Vavrus, Mary, Assistant Professor
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Media studies, feminist theory, cultural studies, critical theory

Wilson, Kirt, Assistant Professor
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Rhetorical theory, rhetoric, U.S. public address, political persuasion

■ Statistics

Bingham, Christopher, Professor
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Directional data analysis, time series analysis, chronobiometry

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Bayesian statistics, optimal design, clinical trials, AIDS research

Cook, R. Dennis, Professor
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Linear and nonlinear models, regression diagnostics, graphical methods

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Bayesian statistics, expert opinion modeling, smoothing analysis, foundations of inference

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Multivariate analysis, probability inequalities, decision theory, Bayesian analysis

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Bayesian inference, model selection, predictivism, sample reuse, diagnostics

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Markov chain Monte Carlo, constrained maximum likelihood, statistical genetics

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Curve estimation, kernel smoothing, AIDS research

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Quality improvement, case diagnostics, geostatistics

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Categorical data, experimental design, computer methods, medical applications

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Statistical education, general theory

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Biostatistics, empirical Bayes, geostatistics, AIDS research

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Experimental design, analysis of variance procedures, population sampling

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Decision theory, Bayesian inference, finite population sampling

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Data analysis, environmental trend analysis, nonparametric regression

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Nonparametrics, survival analysis

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Nonparametric regression, curve/surface fitting, image processing, calibration

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Probability theory, stochastic games, foundations of statistics

Tierney, Luke, Professor
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Reliability, approximate Bayesian inference, statistical computing, dynamic graphics

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Regression and modeling, diagnostics, graphical methods, computing

■ Theatre Arts and Dance

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Directing, acting

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Scene design, scene painting

Chatterjea, Ananya, Assistant Professor
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Dance history and theory

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Modern dance, choreography theory

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Technical production, digital audio, computer control and visual systems

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Directing, acting

Knourek, Pamela, Teaching Specialist
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Costume technology

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Theatre history/theory; medieval, avant-garde, postmodern theatre, historiography

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Costume design, drawing and rendering

Maddux, Margaret L., Associate Professor
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Modern dance, choreography, ethnic and theory

Montgomery, Jean, Associate Professor
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Lighting design, stage management

Nash, Elizabeth, Associate Professor
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Voice, speech, singing

Nolte, Charles, Professor Emeritus
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Theatre history, playwriting

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Shakespeare, dramatic literature, humanities

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Introduction to dance, dance history, technique and composition

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Modern dance, choreography

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Theatre history, Latin American and post-colonial theatre

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Theatre management

■ Women's Studies

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Postcolonialism, South African diaspora, gender, global studies, film

Faunce, Patricia, Professor
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Psychology, personality, therapy, achievement, work, power, sex roles

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African women's history, feminist theory, life history methodology

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Feminist literary theory, Spanish/Latin
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Feminist theories of knowledge, gender,
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Legal theory, women and law, labor/land
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African-American women, LGBT and
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Geography, ethnography, international
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§ Scheman, Naomi, Professor
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Feminist philosophy, interdisciplinary
feminist theories of knowledge, gender/
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Chicana feminist/cultural theory, race,
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Feminist theory and philosophy, gender,
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■ Accounting

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Economic and psychological determinants
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Auditor liability and audit pricing

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Market regulations, investor behavior,
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Executive compensation, management
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■ Business Law

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Investments, portfolio theory and
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Initial public offerings of equity,
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Finance and development, financial
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Pricing of financial assets, futures and
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Asset pricing theories, asset pricing
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Corporate finance, corporate restructuring

*** Rosko, Peter, Associate Professor**
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Financial management

Seguin, Paul, Associate Professor
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Stutzer, Michael J., Associate Professor
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Financial intermediation, asset pricing

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Financial contracting, corporate finance

■ Health Care Management

Begun, James, Professor
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Christianson, Jon, Professor
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Connor, Robert, Associate Professor
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Pennsylvania
Market structure and access to service in
the health sector

Grant, Leslie, Assistant Professor
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Financing, organization, and delivery of
long-term care

Johnson, George, Associate Professor
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Strategy, organizational structure and
effectiveness, health care mergers

Litman, Theodor, Professor
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Medical sociology, health politics and
policy

**Madden, Mary Jane, Assistant
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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

Ahlburg, Dennis A., Professor
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Demographic economics, forecasting,
labor economics

Arvey, Richard D., Professor
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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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Stony Brook
Theory of organization, employee
ownership, nonprofit organizations

§ Bognanno, Mario F., Professor
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Labor economics and policy, collective
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§ 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
Ph.D., Michigan State University
Compensation

Glomb, Theresa, Assistant Professor
Ph.D., University of Illinois

Keane, Michael P., Associate Professor
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§ McCall, Brian, Associate Professor
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Applied econometrics, econometric
theory, economics of information

Remington, John, Professor
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Collective bargaining and industrial
relations, labor arbitration

Sackett, Paul R., Professor
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Personnel decision-making, fairness in
employee testing

Scoville, James G., Professor
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International and comparative industrial
relations

Wanberg, Connie, Assistant Professor
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Psychological experience of
unemployment, job-seeking behavior

Wang, Yijiang, Associate Professor
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Organization theory, theory of the firm,
monetary economics

Whitman, Andrew, Professor
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Insurance law, coverage and claims,
corporate risk management

Zaidi, Mahmood A., Professor
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Labor market analysis, unemployment and industrialized countries

■ **Information and Decision Sciences**

Adams, Carl R., Professor
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Problem-solving methodology

Chervany, Norman L., Professor
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Management of technology-based change

Curley, Shawn P., Associate Professor
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Decision and judgment processes, belief processing

Davis, Gordon B., Honeywell Professor in Information Systems
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MIS planning, information requirements determination

Everest, Gordon C., Associate Professor
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Database management systems, logical data modeling

Goodhue, Dale, Associate Professor
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Data management, measurement methodologies

Hoffmann, Thomas R., Professor
Ph.D., University of Wisconsin
Scheduling, computer programming, assembly line balancing

Johnson, Paul E., Carlson Professor in Decision Sciences
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Decision making, intelligent systems, knowledge work

Kauffman, Robert J., Associate Professor
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Information technology and financial services

March, Salvatore, Professor
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Database design, information systems development

Naumann, J. David, Associate Professor
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Information systems development, application prototyping, telecommunications

Subramani, Mani, Assistant Professor
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Van Cleave, Robert, Lecturer/Coordinator
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Wanninger, Les, Lecturer/Coordinator
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Xia, Wedong, Assistant Professor
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Organizational impact of information technology, information technology and operations/quality management, telecommunications management, end-user computing

■ **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

Childers, Terry L., Professor
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Visual information processing, measurement and psychometrics

Hansen, Robert A., Associate Professor
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Marketing research, strategic marketing planning

Houston, Michael J., Professor
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Consumer behavior and information processing, advertising effects

Meyers-Levy, Joan, Professor
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John, Deborah Roedder, Professor, Carlson Chair in Marketing
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Children's consumer behavior, consumer information processing

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Marketing channels, industrial marketing

Loken, Barbara J., Professor
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Consumer behavior

Rao, Akshay, Associate Professor
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Pricing

Ritson, Mark, Assistant Professor
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Symbolic consumption, qualitative approaches to advertising research

§ Roering, Kenneth J., Professor, Pillsbury/Gerot Chair in Marketing
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Marketing planning and corporate strategy

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New product development, marketing segmentation

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Marketing strategy, marketing organization and implementation

Walker, Orville C., Watkins Professor in Marketing
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Organizational issues in implementation of marketing structures

■ **Operations and Management Science**

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Quality management, operations strategy

Banker, Rajiv, Professor
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Operations management, production and inventory management

Li, William, Assistant Professor
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Experimental design, optimal design, robust design

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Operations research, operations management

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Total productive maintenance, production control systems

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Nachtsheim, Christopher J., Professor
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Experimental design, regression and analysis of variance

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Operations strategy, quality management process innovation

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Management of technology, operations strategy

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Computational probability, stochastic networks

■ **Strategic Management and Organization**

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Organizational change, metaphor and organizational change

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Corporate responsibility, international business ethics

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Risk-taking in organizations, strategic decision processes

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Strategic adaptation, management of technology

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Antitrust economics, venture capital

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International trade policy, international political economy

Maitland, Ian, Professor
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Business ethics, ethics and markets

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Acquisition of competence and organizational learning

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Public school leadership and strategy, executive education

Murtha, Thomas, Associate Professor
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Global sourcing strategy and management, industrial policy

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Individual and organizational decision making, organizational design

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Competitive advantage, resource-based theory

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Competitive advantage, resource-based theory, deregulation

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Organizational behavior, social networks, group goal setting, negotiation

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Corporate governance, mergers and acquisitions

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Organization and management theory, management of innovation and change

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Competitive advantage for inter-firm relationships

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Dynamic competitive advantage, the process of globalization

Division of Medical Technology

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Cell matrix, basement membranes, tumor metastasis, peptides

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Education, student recruitment and retention, clinical chemistry

Faculty

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Philip J. Splett, M.S., Coordinator, Career Services

Scott M. Lanyon, Ph.D., Director, James Ford Bell Museum of Natural History

Karen Lee Davis, Director, James Ford Bell Museum of Natural History

Faculty

■ Fisheries and Wildlife

Adelman, Ira R., Professor and Head
Ph.D., University of Minnesota
Fisheries management and aquaculture

Andersen, David E., Associate Professor
Ph.D., University of Wisconsin, Madison
Avian ecology and conservation

Atchinson, Gary, Adjunct Faculty
Ph.D., Michigan State University
Aquatic toxicology

Best, Louis, Adjunct Faculty
Ph.D., University of Illinois
Avian ecology

Cohen, Yosef, Professor
Ph.D., University of California, Berkeley
Populations, mathematical ecology,
ecosystem conservation

Cooper, James A., Associate Professor
Ph.D., University of Massachusetts
Waterfowl and wetland ecology

Cuthbert, Francesca J., Professor
Ph.D., University of Minnesota
Conservation and biology of birds;
endangered species conservation

DelGiudice, Glenn D., Adjunct Faculty
Ph.D., University of Minnesota
Nutritional and physiological ecology of
large mammals

Frenzel, L. Daniel, Professor Emeritus
Ph.D., University of Minnesota
Raptor ecology

Fulton, David C., Assistant Professor
Ph.D., Colorado State University
Human dimensions of fish and wildlife
management

Garshelis, David, Adjunct Faculty
Ph.D., University of Minnesota
Monitoring and managing large mammal
populations

Johnson, Mark R., Adjunct Faculty
D.V.M., Colorado State University
Wildlife handling and techniques for
research and management

Jordan, Peter A., Associate Professor
Ph.D., University of California, Berkeley
Ecology and management of mammalian
herbivores

Joshi, Anup, Research Associate
Ph.D., University of Minnesota
Asian mammal conservation

Kapuscinski, Anne R., Professor
Ph.D., Oregon State University
Fisheries genetics; aquatic biotechnology
assessment

Kitts, James R., Associate Professor
Ph.D., Utah State University
Extension education; human-wildlife
interactions

Miller, Loren M., Research Associate
Ph.D., University of Minnesota
Fisheries conservation genetics

Newman, Raymond M., Associate Professor
Ph.D., University of Minnesota
Aquatic ecology and fisheries
management

Pease, James L., Adjunct Faculty
Ph.D., Iowa State University
Human dimensions of wildlife
management

Simons, Andrew M., Assistant Professor
Ph.D., University of Alabama, Tuscaloosa
North American freshwater fish
systematics

Smith, James L.D., Associate Professor
Ph.D., University of Minnesota
Biology and conservation of Asian
mammals

Sorensen, Peter W., Professor
Ph.D., University of Rhode Island
Fish behavior, physiology and
chemoreception

Spangler, George R., Professor
Ph.D., University of Toronto
Population dynamics of fish, native
American resource management

Vondracek, Bruce C., Associate Professor
Ph.D., University of California, Davis
Stream ecology and restoration

Waters, Thomas F., Professor Emeritus
Ph.D., University of Minnesota
Stream 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

Gertjejansen, 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

Peterson, 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

Sarkanen, Simo, Associate Professor
Ph.D., University of Washington
Wood and lignin chemistry

Schmidt, Elmer L., Professor
Ph.D., University of Minnesota
Wood deterioration/protection

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

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

■ Forest Resources

Alm, Alvin A., Professor Emeritus
Ph.D., University of Minnesota
Silviculture, reforestation

§ Anderson, Dorothy H., Professor
Ph.D., Colorado State University
Recreation resources management and
policy analysis

Bakuzis, Egolfs V., Professor Emeritus
Ph.D., University of Minnesota
Forest ecology, ecosystem foundations

Bauer, Marvin E., Professor
Ph.D., University of Illinois
Remote sensing of soils, crops and forests

Baughman, Melvin J., Professor
Ph.D., University of Minnesota
Policy taxation economics and
management

Bengston, David N., Adjunct Faculty
Ph.D., University of Minnesota
Economics, technical change, research
planning, evaluation

Blinn, Charles R., Professor
Ph.D., Virginia Polytechnic Institute and State University
Management, economics, marketing, and harvesting

Bolstad, Paul V., Associate Professor
Ph.D., University of Wisconsin
Geographic information systems and forest ecology

Brooks, Kenneth N., Professor
Ph.D., University of Arizona
Forest hydrology, modeling impacts of land use on water resources

Burk, Thomas E., Professor
Ph.D., University of Minnesota
Biometrics: forest growth modeling and experimental design

Carlson, Stephen L., Associate Professor
Ph.D., Michigan State University
Youth development, park and recreation resources

Daley-Laursen, Steven B., Associate Professor
Ph.D., University of Idaho
Silviculture, ecology, and policy

David, Andrew J., Assistant Professor
Ph.D., Michigan State University
Forest genetics

Eckman, Karlyn, Adjunct Faculty
Ph.D., University of Minnesota
Community/social forestry planning

Ek, Alan R., Professor and Head
Ph.D., Oregon State University
Resource survey design, modeling forest dynamics, research planning

Ellefson, Paul V., Professor
Ph.D., Michigan State University
Economics, policy, and administration

Frellich, Lee E., Research Associate
Ph.D., University of Wisconsin
Forest ecology

Gregersen, Hans M., Professor
Ph.D., University of Michigan
Economics, social cost-benefit analysis, international forestry

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

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

Johnson, Gary R., Associate Professor
M.S., Western Illinois University
Urban and community forestry

Kurmis, Vilis, Professor Emeritus
Ph.D., University of Minnesota
Forest ecology

Lime, David W., Senior Research Associate
Ph.D., University of Pittsburgh
Recreation resources management and tourism

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

§ Perry, James A., Professor
Ph.D., Idaho State University
Water quality, aquatic systems monitoring, watershed 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

Rose, Dietmar W., Professor
Ph.D., University of Wisconsin
Forest economics, planning models, timber supply analysis

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

Splett, Philip J., Instructor
M.S., University of Minnesota
Career planning, plant taxonomy

Stine, Robert A., Research Associate
Ph.D., University of Minnesota
Forest genetics and tree improvement

Suuff, Edward I., Professor Emeritus
Ph.D., University of Maryland
Tree physiology, nutrient-water interactions, forest decline

Thompson, Jerrilyn L., Research Fellow
M.S., University of Minnesota
Recreation resources management

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

School of Nursing

Administration

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, Assistant 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, Derryl, Assistant Professor
Ph.D., University of Pennsylvania
Public health nursing

Bohn, Diane, Assistant Professor
D.N.Sc., Rush University, Chicago
Effects of abuse on women's health

Brauer, Donna, Assistant Professor
Ph.D., University of Minnesota
Health outcomes in adults with chronic conditions

Chlan, Linda L., Assistant Professor
Ph.D., University of Minnesota
Technology and home health nursing, holistic interventions

Corcoran-Perry, Sheila A., Professor
Ph.D., University of Minnesota
Decision-making in health care

Crisham, Patricia, Associate Professor
Ph.D., University of Minnesota
Ethical issues in nursing

*** 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

Feldman, Bernadine, Associate Professor
Ph.D., University of Minnesota
Workforce issues related to staff nursing in acute care

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

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

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, Assistant 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 widwifery, women's health, depression and the family

Post-White, Janice, Assistant Professor
Ph.D., University of Minnesota
Psychoneuroimmunology and cancer

*** Ryden, Muriel B., Professor**
Ph.D., University of Minnesota
Gerontological nursing, institutionalization

Snyder, Mariah, Professor, Division Head I

Ph.D., University of Minnesota
Nursing interventions; identification and determining efficacy

Tomlinson, Patricia, Professor

Ph.D., Oregon State University
Parent-infant attachment, role transitions, family stress

Urueta, Romana, Assistant Professor

M.S., University of California, Los Angeles
Pediatric nursing

Weisensee, Mary G., Assistant Professor

Ph.D., Michigan State University
Caregivers' perceptions

Wyman, Jean, Professor

Ph.D., University of Washington
Urinary incontinence, behavioral interventions, quality of life

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

Boehm, Deborah

M.P.H., A.N.P., University of Minnesota
Women's health care, primary health care

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

Karnes, Nancy

M.S., C.C.R.N., Loyola University
Critical care

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

Moe, Jon

M.S., University of Minnesota
Adult health

Nygaard, Georgia, Coordinator, family nurse practitioner area of study

M.S., A.N.P., College of St. Catherine, St. Paul
Primary care of adults

Peters, Jennifer

Ph.D., University of Iowa
Gerontology

Pougiales, Katina

M.S., University of Minnesota
Mental health

Quast, Sharon

M.P.H., University of Minnesota
Education/mental health and pediatrics, role modeling

Rabinowitz, Linda

M.S., Texas Women's University
Prenatal health care

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

Weiss, Pam

Ph.D., University of Minnesota
Acupuncture—painful peripheral neuropathies

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. Kurtz, Director, Career Services

Susan Ellis Marino, Director, Program for Women

Madonna Monette, Finance Director

Samuel Moore, 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**

Alving, Amy E., Associate Professor

Ph.D., Princeton University
Experimental research in turbulence and fluid 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., Associate 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., Professor, Distinguished McKnight University Professor

Ph.D., Johns Hopkins University
Thermodynamics of solids; phase transformations; micromagnetics

Joseph, Daniel D., Professor, Regent's 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.

Plunkett, Robert, Professor Emeritus

Sc.D., Massachusetts Institute of Technology
Structural dynamics; fluid-solid interaction; composite materials, vibrational control

Shield, Thomas W., Associate Professor

Ph.D., University of California, Berkeley
Experimental solid mechanics; mechanics of materials; fracture mechanics

Stolarik, Eugene, Associate Professor Emeritus

M.S., University of Minnesota
Flight mechanics of aircraft and reentry vehicles, V/STOL, aerodynamics

Truskinovsky, Lev, Associate Professor

Ph.D., Academy of Sciences, U.S.S.R.
Nonlinear continuum mechanics; thermodynamics; fracture; phase transformations; geophysics

§ **Vano, Andrew**

B.A.E., University of Minnesota
FAA DER (Flight Analyst, structures, systems and equipment, Powerplant installation and Test Pilot). Aircraft and spacecraft design; flight testing; project management

Warner, William H., Professor Emeritus

Ph.D., Carnegie Institute of Technology
Optimization methods in mechanics, biorthogonal series for solutions of polyharmonic equations

Wilson, Theodore A., Professor

Ph.D., Cornell University
Respiratory mechanics, modeling lung structure and deformation, respiratory flow

§ **Zhao, Yiyuan, Associate Professor**

Ph.D., Stanford University
Guidance/control; optimization; dynamics; air traffic management

■ **Astronomy**

Davidson, Kris, Professor

Ph.D., Cornell University
Theoretical astrophysics, luminous stars, primordial element abundances

§ **Dickey, John, Professor**

Ph.D., Cornell University
Galactic and extragalactic radio astronomy, neutral hydrogen studies

§ **Gehrz, Robert, Professor and Director, Mt. Lemmon and O'Brien observatories**

Ph.D., University of Minnesota
Infrared astronomy, novae, comets

§ **Humphreys, Roberta, Professor**

Ph.D., University of Michigan
Luminous stars, stellar evolution, optical spectroscopy, galactic structure

§ **Jones, Terry, Professor and Assistant Director, Mt. Lemmon and O'Brien observatories**

Ph.D., University of Hawaii
Infrared astronomy, late type stars, polarimetry

Jones, Thomas, Professor

Ph.D., University of Minnesota
Computational astrophysics, cosmic ray production, supernovae remnants, shocks

Kuhi, Leonard, Professor

Ph.D., University of California at 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 at 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

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

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, Prodomos, 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., Associate 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

Tannenbaum, Rina, Assistant Professor
D. Sc., The Swiss Federal Institute of Technology
Metal cluster chemistry, interfacial chemistry and catalysis

Tirrell, Matthew, Professor
Ph.D., University of Massachusetts
Polymer properties, interfaces and transport, biomedical engineering

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

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

Britton, Doyle, Professor
Ph.D., California Institute of Technology
Inorganic 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
- 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
- § 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
- Jeffrey Roberts, 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
- York, Darrin, Assistant Professor**
Ph.D., University of North Carolina, Chapel Hill
Physical, theoretical, and computational chemistry
- Zhu, Xiaoyang, Associate Professor**
Ph.D., University of Texas at Austin
Materials, physical, and analytical chemistry
- **Civil Engineering**
- Arndt, Roger E. A., Professor**
Ph.D., Massachusetts Institute of Technology
Cavitation and bubble dynamics, hydropower, noise generated by fluid flow
- 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 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
- Davis, Gary A., Associate Professor**
Ph.D., University of Washington
Statistics in transportation planning, traffic control, traffic safety
- Detournay, Emmanuel, Associate 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
- Farrell, Cesar, Professor**
Ph.D., University of Iowa
Fluid mechanics, hydraulic engineering, wind engineering, turbulent flows
- 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
- 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
- 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
- Labuz, Joseph F., Associate Professor**
Ph.D., Northwestern University
Experimental geomechanics; fracture of quasi-brittle materials
- Michalopoulos, Panos G., Professor**
Ph.D., University of Florida
Traffic engineering operations and control; traffic flow theory
- Newcomb, David E., Associate Professor**
Ph.D., University of Washington
Bituminous materials, pavement design and pavement rehabilitation
- 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
- Reid, Kenneth J., Professor**
Ph.D., Cambridge University
Process engineering in minerals, metallurgy and water resources
- 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**
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**
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
- 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

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
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, multi-agent systems, teletaction

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
Dr.ing, Paris University
Hydrogeology, groundwater-surface interactions, hydrocarbon contamination of shallow aquifers

Runkel, Anthony C., Adjunct Faculty
Ph.D., University of Texas at Austin
Stratigraphic and sedimentologic attributes of Paleozoic strata

Seyfried, 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
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

Plice, William, Associate Professor Emeritus
Ph.D., University of Minnesota
Computer architecture and logic design

§ Polla, Dennis L., Professor
Ph.D., University of California, Berkeley
Design and fabrication of integrated microsensors and microactuators

Riaz, Mahmoud, Professor
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

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

■ **Geological Engineering**

Faculty listed under Civil Engineering

■ **Mathematics**

Adams, Scot, Associate Professor
Ph.D., University of Chicago
Dynamical systems, differential geometry

Aeppli, Alfred, Professor
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, Associate 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, Regent's 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

Jian, 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, Associate 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

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

Sattinger, David, Professor
Ph.D., Massachusetts Institute of Technology
Applied mathematics

Sell, George R., Professor
Ph.D., University of Michigan
Differential equations

Sibuya, Yasutaka, Professor
D.Sc., Tokyo University
Ordinary differential equations

Sperber, Steven I., Professor
Ph.D., University of Pennsylvania
Algebraic number theory and geometry

Stanton, Dennis, Professor
Ph.D., University of Wisconsin
Combinatorics

Storvick, David, Professor
Ph.D., University of Michigan
Complex variables

Sverak, Vladimir, Professor
Ph.D., Charles University, Prague, Czech Republic
Calculus of variations, non-linear elasticity

Webb, Peter, Professor
Ph.D., University of London
Group theory

White, Dennis, Professor
Ph.D., University of California, San Diego
Combinatorics

■ Mechanical Engineering

§ 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 at 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

§ Davidson, Jane H., Associate 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., Regent's 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
Ph.D., Purdue University
Applied thermodynamics, very high temperature solar processes and thermochemistry

§ Frohrib, Darrell A., Professor
Ph.D., University of Minnesota
Engineering design, vibration

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§ Lewis, Jack L., Professor
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§ Marple, Virgil A., Professor
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§ Pfender, Emil, Professor
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§ Strykowski, Paul J., Professor
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Theoretical condensed matter physics

§ Lysak, Robert, Professor
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History of science; Newton; optics; Scientific Revolution

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Theoretical condensed matter physics

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Space plasma physics

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Physics of superfluid liquid helium

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Regression and modelling, diagnostics, graphical methods, computing

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Course Numbers, Symbols, and Abbreviations

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.
- UC University College.

Course Listing Sample

